The National Conference on Mechanics and Materials (NCMM'2023) will be held in Faculty of Technology / Boumerdes University, Algeria during December 06-07, 2023. The main goal of which is to strengthen communication between the higher education family and industrialists, bring the socio-economic sector closer to academic skills and public administration. Our goal is to establish a national ecosystem favourable to investment, through communication between the sectors concerned. Also, through this conference, we wish to draw a roadmap that pushes the economy and national development towards progress.

Organised by

ISBN: 978-9969-9733-0-3

2nd National Conference on Mechanics and Materials (CNMM2023)
ISBN: 978-9969-9733-0-3

2nd National Conference on Mechanics and Materials

Boumerdes 2023

2nd National Conference on Mechanics and Materials (CNMM2023)

Boumerdes- Algeria, December 06&07, 2023

Editors

A. CHELLIL
S. LECHEB
H. MECHAKRA
B. SAFI
A. DAOUI

SECOND NATIONAL CONFERENCE ON MECHANICS AND MATERIALS

2ndNCMM2023

Boumerdes - Algeria, Dec 06 - 07, 2023

ISBN: 978-9969-9733-0-3
Dépôt legal: 9969-2023

Edition

Faculty of Technology M'Hamad Bougara University of Boumerdes, Algeria

CNMM-2023

Editors:

Ahmed CHELLIL
Samir LECHEB
Hamza MECHAKRA
Brahim SAFI
Abdelhakim DAOUI

ISBN:978-9969-9733-0-3
Dépôtlégal: 9969-2023

Le secrétariat du Conference :
Website*cnmm2023@sciencesconf.org*

Preface

Scientific and Advisory Committee

Organization Committee

Plenary Conferences

List of Abstracts

The second National Conference on Mechanic and Material (NCMM'2023) will be held in Faculty of Technology / Boumerdes University, Algeria during November 15-16, 2023. The main goal of which is to strengthen communication between the higher education family and industrialists, bring the socio-economic sector closer to academic skills and public administration. Our goal is to establish a national ecosystem favorable to investment, through communication between the sectors concerned. In addition, through this conference, we wish to draw a roadmap that pushes the economy and national development towards progress.

To this end, this conference focuses on topic below:

Topic 01: Materials Science

Topic 02: Mechanical Construction and Manufacturing

Topic 03: Maintenance

Topic 04: Vibration and dynamic

Topic 05: Fracture Mechanics and Fatigue and Damage

Topic 06: Non Destructive Testing and detection

Topic 07: Composite Materials

Topic 08: Tribology

Topic 09: Mechatronics and Electromechanical

Topic 10: Industrial Engineering

Topic 11: Energetic and Renewable Energy

Topic 12: Innovation and Startup

Topic 13: Green hydrogen and recycling

Topic 14: Civil engineering

Topic 15: Intelligence Artificial and Robotic

Topic 16: Process Engineering

Ahmed CHELLIL
Samir LECHEB
Hamza MECHAKRA
Brahim SAFI
Abdelhakim DAOUI

Scientific and Advisory Committee

Honorary Presidents:

Prof. YAHI Mostepha, Rector of Univ. Boumerdes

Prof. SAIDI Mohamed, Dean of the Technology Faculty

Chairman of NCMM2023:

Pr. A. CHELLIL, M'hamed Bougara University of Boumerdes, Algeria

Chairman of Organization Committee

Pr. S. LECHEB, M'hamed Bougara University of Boumerdes, Algeria

Co-Chairman of Organization Committee

Dr. H. MECHAKRA,M'hamed Bougara University of Boumerdes, Algeria

Organization Committee

Dr. A. DAOUI, M'hamed Bougara University of Boumerdes, Algeria
Mr. M. RADI, M'hamed Bougara University of Boumerdes, Algeria

President of Scientific Committee:

Pr. B. SAFI, M'hamed Bougara University of Boumerdes, Algeria

ScientificCommittee

Pr. Mohammedi K	*U. Boumerdes, Algeria*	*Pr. Si-Chaib M.O*	*U. Boumerdes, Algeria*
Pr. Adjrid S	*U. Boumerdes, Algeria*	*Pr. Touati Y*	*U. Boumerdes, Algeria*
Pr. PHAN T	*U. Ton Duc Thang, Vietnam*	*Pr. Mellal MA*	*U. Boumerdes, Algeria*
Pr. Aknouche H	*U. Boumerdes, Algeria*	*Pr. Touati Y*	*U. Boumerdes, Algeria*
Pr. Chemani B	*U. Boumerdes, Algeria*	*Dr. Dilmi H*	*U. Boumerdes, Algeria*
Pr. Nour A	*U. Boumerdes, Algeria*	*Dr. Amoura N*	*U. Médéa, Algeria*
Pr. Chevalier Y	*ISMER-Paris, France*	*Dr. Boutoutaou H*	*U. Boumerdes, Algeria*
Pr. Jean-Paul DRON	*U. Reims, France*	*Dr. Chikh N*	*U. Bordj Bouareridj, Algeria*
Pr. Benazouz D	*U. Boumerdes, Algeria*	*Dr. Merah A*	*U. Boumerdes, Algeria*
Pr. Zerizer A	*U. Boumerdes, Algeria*	*Dr. Rahmoune C*	*U. Boumerdes, Algeria*
Pr. Kebir H	*U. Compiègne, France*	*Dr. Benderradji R*	*U. M'sila, Algeria*
Pr. Aboutaleb D	*U. Boumerdes, Algeria*	*Dr. Adiche C*	*U. Boumerdes, Algeria*
Pr. Oudia K	*U. Toulouse, France*	*Dr. Tazrout M*	*U. Boumerdes, Algeria*
Pr. Hamdi A	*ENIT, Tunisia*	*Dr. Himrane N*	*U. Boumerdes, Algeria*
Pr. Carmen C. R	*U. Galati, Romania*	*Dr. Guerache F*	*U. Boumerdes, Algeria*
Pr. Saci R	*U. Boumerdes, Algeria*	*Dr. Brahimi F*	*U. Boumerdes, Algeria*
Pr. Khetib Y	*U. King Abdulaziz, Saudi Arabia*	*Dr. Berazouane S*	*U. Boumerdes, Algeria*
Pr. Rechak S	*E. Polytechnique, Algeria*	*Dr. Ratni A*	*U. Boumerdes, Algeria*
Pr. Ouinas D	*U. Mostaganem, Algeria*	*Dr. Ikkache K*	*U. Boumerdes, Algeria*
Pr. Belhouari M	*U. Sidi Bel Abbès, Algeria*	*Dr. Grabi M*	*U. Boumerdes, Algeria*
Pr. Refassi K	*U. Sidi Bel Abbès, Algeria*	*Dr. Siguerdjidjene H*	*U. Boumerdes, Algeria*
Pr. Hamadi F	*U. Bechar, Algeria*	*Dr. Nadir M*	*U. Boumerdes, Algeria*
Pr. Aguib S	*U. Boumerdes, Algeria*	*Dr. Lamri Y*	*U. Boumerdes, Algeria*
Pr. Djebili O	*U. Boumerdes, Algeria*	*Dr. Messaid B*	*U. Boumerdes, Algeria*
Pr. Mellal MA	*U. Boumerdes, Algeria*	*Dr. Houari A*	*U. Boumerdes, Algeria*
Pr. Aissani L	*U. Khanchela, Algeria*	*Dr. Chahour.K*	*U.Tizi-ouzou, Algeria*

KeynoteSpeakers

Plenary I- Prof. Samir LECHEB, Dircetor of Incubator, UniversityM'hamed Bougara Boumerdes, Algeria ; *''Support of startups and spinoffs to obtain label by university incubators for develop innovation in Algeria''*

As part of ministerial decree 1275 for the support of end-of-cycle students: third year bachelor's degree, second year master's degree and doctoral student, innovative project leaders, to create startups and spinoffs, through workshops and training at the level university incubators and accelerators, in collaboration with research centers and the socio-economic sector. In order to develop innovation and encourage as many young people as possible to enter the field of business in Algeria.

Keys Words: Startup, Spinoff, Innovation, Incubator, University

Plenary II- Prof. Kamel Mohammedi,University M'hamed Bougara Boumerdes, Algeria ;'' *Green Hydrogen and Long Term Energy Strategies''*

Plenary III- Prof. Leila ALIOUANE, UniversityM'hamed Bougara Boumerdes, Algeria;''*artificial intelligence in earth sciences for porosity prediction in petroleum reservoir from geophysical well-logs data'',*

Artificial Intelligence techniques are becoming very popular in earth sciences, in the last decade, mainly in petroleum exploration and exploitation. Reservoir characterization by geophysical well-logs data analysis is commonly conducted and plays a central role in formation evaluation in petroleum domain. The most petrophysical parameters that describe the reservoir are the porosity, the permeability and the water saturation where the porosity is the main key. Using conventional methods, the estimation of the porosity is very difficult, mainly in shaly reservoirs where the presence of clay affects considerably, the porosity and the permeability. For that, we propose to accurately predict the porosity from geophysical recordings crossed the formation of wells using machine-learning methods such as multilayer neural network. The input layer are constituted by the petrophysical well-logs data and the output layer presented by one neuron corresponding to the porosity predicted.

Topics

Topic 01: Materials Science .....

Topic 02: Mechanical Construction and Manufacturing .....

Topic 03: Maintenance .....

Topic 04: Vibration and dynamic .....

Topic 05: Fracture Mechanics and Fatigue and Damage .....

Topic 06: Non Destructive Testing and detection .....

Topic 07: Composite Materials .....

Topic 08: Tribology .....

Topic 09: Mechatronics and Electromechanical .....

Topic 10: Industrial Engineering .....

Topic 11: Energetic and Renewable Energy .....

Topic 12: Innovation and Startup .....

Topic 13: Green hydrogen and recycling .....

Topic 14: Civil engineering .....

Topic 15: Intelligence Artificial and Robotic .....

Topic 16: Process Engineering .....

SUMMARY

Page	*Ref. ID*	*Title*
1	*T01-2023002*	*VALORIZATION OF WASTE PALM FIBER AND USE AS REINFORCEMENT IN BIOCOMPOSITE MATERIALS*
2	*T01-2023003*	*STRUCTURAL AND UV-VISIBLE ABSORPTION, PHOTOLUMINESCENCE PROPERTIES OF SQUARE-PLANER NICKEL(II) COMPLEXES*
3	*T01-2023005*	*HOMOGENIZATION TECHNOLOGIE TO ACHIEVE NUMERICAL ESTIMATION OF MULTI MATERIAL MECHANICAL BEHAVIOR IN MICROELECTRONICS*
4	*T01-2023006*	*LABORATORY OF PHYSICS OF EXPERIMENTAL TECHNIQUES AND ITS APPLICATIONS, UNIVERSITY OF MEDEA, ALGERIA.*
5	*T01-2023010*	*STARCH NANOPARTICLES PREPARATION VIA A SIMPLE NANOPRECIPITAION TECHNIQUE*
6	*T01-2023011*	*HETEROGENOUS FENTON-LIKE DEGRADATION OF METHYLENE BLUE IN PRESENCE OF MAGNESIUM FERRITE NANOPARTICLES*
7	*T01-2023012*	*OPTIMIZATION OF SAND CONCRETE PERFORMANCE VIA MIXTURE DESIGN METHOD*
8	*T01-2023013*	*FIRST-PRINCIPLES INVESTIGATION OF STRUCTURAL, ELECTRONIC, ELASTIC, THERMODYNAMIC, OPTICAL, AND THERMOELECTRIC PROPERTIES OF MGSNO3 PEROVSKITE COMPOUND*
9	*T01-2023014*	*X ray diffraction study of structural properties of Fe86Cr14 mechanical alloys, Effect of process control agent*
10	*T01-2023015*	*A NOVEL C0 STRAİN BASED FİNİTE ELEMENT FOR STATİC ANALYSES OF FUNCTİONALLY GRADED PLATES*
11	*T01-2023017*	*THEORETICAL AND EXPERIMENTAL INVESTIGATION OF HYDROXYAPATITE CERAMIC*
12	*T01-2023018*	*HARD MATERIALS POLISHING USING CERIUM OXIDE*
13	*T01-2023019*	*THE APPLICATION OF ANALYTICAL TECHNIQUES FOR A COMPREHENSIVE UNDERSTANDING OF GLAZE CERAMIC COMPOSITIONS AND STRUCTURES*
14	*T01-2023020*	*THE STRUCTURAL AND ELECTRONIC PROPERTIES OF BROOKITE TIO2: A FIRST–PRINCIPLES STUDY FIRST-PRINCIPLES STUDY*
15	*T01-2023021*	*STUDY OF PHOSPHORUS, NITROGEN AND ARSENIC DOPED GERMANIUM*
16	*T01-2023022*	*EXPERIMENTAL EVALUATION OF LIGHTWEIGHT FOAM CONCRETE USED IN THERMAL INSULATION OF BUILDING*
17	*T01-2023024*	*EFFECT OF RECRYSTALLIZATION ONTHE MECHANICAL PROERTIES OF COLD ROLLED X38 STEEL*
18	*T01-2023025*	*NUMERICAL OPTIMIZATION OF THE DEEP DRAWING OPERATION OF DC04 STEEL SHEET*
19	*T01-2023026*	*OPTIMIZING OF ANTIREFLECTIVE COATINGS: A SIMULATION STUDY USING TiO2 AND SiO2 DEPOSITIONS*
20	*T01-2023028*	*EFFECT OF ROTARY FRICTION WELDING (RFW) PARAMETERS ON STRAIN HARDENING BEHAVIOR OF AUSTENITIC STAINLESS STEEL JOINTS.*
21	*T01-2023030*	*EFFECT OF TEMPERATURE ON THE ELABORATION OF NICKEL COATINGS ON COPPER*
22	*T01-2023032*	*STUDY OF THE SOLID-LIQUID INTERFACE USING THE SPECS METHOD*
23	*T01-2023033*	*MODELING THE PROPERTIES OF ZERO-DIMENSIONAL ARSENIC NANOMATERIALS DOPED WITH ONE TRANSITION METAL ATOM*
24	*T01-2023034*	*FADDEEV-JACKIW QUANTIZATION AND ITS APPLICATION TO MAXWELL FIELD.*
25	*T01-2023036*	*ELECTRONIC STRUCTURE OF (INN)N/(GAN)N(001) SUPERLATTICES*
26	*T01-2023037*	*THE EFFECT OF HYBRID NANO-FLUID □AL□_2 O_3-CNT/WATER IN A HEAT EXCHANGER RECTANGULAR-SHAPED TUBE*
27	*T01-2023038*	*TRIBOLOGICAL AND MORPHOLOGICAL PROPERTIES OF FILMS DEPOSIT ON METALLIC PROSTHESES*

28	**T01-2023039**	*PERFORMANCE EVALUATION OF TUBE / SHELL HEAT EXCHANGERS USING ZNO-MWCNT/WATER HYBRID NANO FLUID*
29	**T01-2023165**	*DFT CALCULATIONS OF CUBIC PEROVSKITE BASNO3 FOR OPTOELECTRONIC APPLICATIONS*
30	**T01-2023171**	*Contribution à l'étude des propriétés physiques et mécaniques du bois de chêne zeen en Algérie effet station*
31	**T01-2023180**	*INFLUENCE OF THE MATERIAL DISTRIBUTION LAWS OF THE VOIGT AND MORI-TANAKA MODEL ON THE FREE VIBRATION OF A THICK BEAM*
32	**T01-2023184**	*GSTC-FDTD SIMULATION OF LORENTZIAN DISPERSIVE METASURFACES*
33	**T01-2023187**	*Characterization of galactoglucomannans from Pinus halepensis for biopolymer applications*
34	**T01-2023240**	*INVESTIGATE THE STRUCTURAL, ELECTRONIC, AND MAGNETIC PROPERTIES OF THE QUATERNARY HEUSLER ALLOY COMNVSI*
35	**T01-2023256**	*ETUDE THÉORIQUE DES PROPRIÉTÉS STRUCTURALES, MÉCANIQUES, THERMIQUES ET TRANSPORTS DES ALLIAGES HALF- HEUSLER, POUR UNE SIMULATION PAR MEF D'UN ACTIONNEUR ÉLECTROTHERMIQUE MEMS*
36	**T01-2023267**	*STRUCTURAL, ELECTRONIC, MAGNETIC AND MECHANIC PROPERTIES OF THE FULL-HEUSLER ALLOY CO2MNGA*
37	**T01-2023273**	*MODELING THE RESPONSE OF FIBER-REINFORCED CONCRETE BEAMS – EFFECT OF TIRE-RECLAIMED FIBERS*
38	**T02-2023041**	*MULTI-OBJECTIVE OPTIMISATION OF TURNING PROCESS PARAMETERS USING MAIRCA METHOD*
39	**T02-2023042**	*OPTIMIZING CUTTING PARAMETERS WHEN MACHINING AISI 4140*
40	**T02-2023046**	*CUTTING PERFORMANCE AND WEAR MORPHOLOGY OF TIN AND TIALN COATED CARBIDE AND UNCOATED CARBIDE TOOLS DURING DRY TURNING OF TI–6AL–4V*
41	**T02-2023047**	*Improvement of the surface roughness of an aluminum alloy 2017 by the application of the ball burnishing process.*
42	**T02-2023168**	*MODELING OF TECHNOLOGICAL PARAMETERS IN A FINISHING TURNING OPERATION OF TI-6AL-4V TITANIUM ALLOY USING THE ANOVA ANALYSIS AND THE ARTIFICIAL NEURAL NETWORK METHOD (ANN)*
43	**T02-2023175**	*STATIC ANALYSIS OF THE BEHAVIOR OF SMART SANDWICH BEAMS IN MAGNETORHEOLOGICAL ELASTOMER – HONEYCOMB*
44	**T03-2023048**	*VIBRATION BASED CONDITION MONITORING APPROACH USING THE NONLINEAR AUTOREGRESSIVE MODEL WITH EXOGENOUS INPUT AND THE DECISION TREE ALGORITHM.*
45	**T03-2023049**	*REMAINING USEFUL LIFE PREDICTION BASED ON THE SUPPORT VECTOR REGRESSION AND THE STEPWISE ALGORITHM.*
46	**T03-2023052**	*ANALYSIS AND INVESTIGATION OF THE VIBRATIONAL PATTERN OF MECHANICAL DEFECTS VIA A NEURAL MODEL*
47	**T03-2023156**	*ASSESSSMENT OF MAINTENANCE EFFICIENCY IN THE MODELS : AGE REDUCTION, REDUCTION OF INTENSITY AND HYBRID*
48	**T03-2023182**	*MONITORING AND DIAGNOSIS OF ROTATING MACHINE FAULTS IN THE FREQUENCY DOMAIN*
49	**T04-2023053**	*APPLICATION OF SIGNAL PROCESSING FOR FAULT DIAGNOSIS OF MECHANICAL COMPONENTS SUBJECTED TO VIBRATION*
50	**T04-2023055**	*Study of the parameters influencing the surface roughness of a steel material*
51	**T04-2023155**	*DYNAMIC BEHAVIOR AND VIBRATION CONTROL OF ROTATING MACHINERY WITH VARIABLE BEARING DAMPING*
52	**T05-2023056**	*NUMERICAL ANALYSIS TO EVALUATE THE CRACK ENERGIES BY THE FEM METHOD OF A CRACKED STRUCTURE OF A TWO-DIMENSIONAL MODEL IN THE ELASTOPLASTIC MATERIAL*
53	**T05-2023057**	*FRETTING FATIGUE SIMULATION ON HOMOGENEOUS ISOTROPIC LINEAR ELASTIC MATERIALS BY THE FEM METHOD OF A 2D*

54	***T05-2023058***	*MODELING THE EFFECT OF TRIAXIALITY AND LODE ANGLE ON THE RUPTURE OF STAINLESS STEEL USING A DISLOCATION DENSITY - BASED MODEL*
55	***T05-2023060***	*EFFECT OF GEOMETRIC PARAMETERS ON STRESS CONCENTRATION IN PLATE WITH A HOLE SUBJECTED TO A TENSILE FORCE*
56	***T05-2023178***	*NUMERICAL STUDY OF A CRACKED PLATE REPAIRED BY WELDING*
57	***T05-2023188***	*EFFECT OF THE AGING OF THE ADHESIVE ON THE BEHAVIOR OF REPAIRED CREAKED STRUCTURES IN PURE MODE I AND II*
58	***T06-2023062***	*PROBING CFRP FIBER ORIENTATION WITH EDDY CURRENTS: A NON-DESTRUCTIVE APPROACH*
59	***T06-2023063***	*NONDESTRUCTIVE CHARACTERIZATION OF FERROMAGNETIC STEELS BY MAGNETIC BARKHAUSEN NOISE TECHNIQUE*
60	***T06-2023173***	*USING A NON-DESTRUCTIVE TECHNIQUES FOR WOOD CHARACTERIZATION AND DEFECTS DETECTION*
61	***T07-2023065***	*ARTIFICIALLY FROZEN SAWDUST-ICE MIXTURE (PYKRETE): A REVIEW OF ITS USABILITY IN CIVIL ENGINEERING APPLICATIONS*
62	***T07-2023066***	*COUPLED DAMAGE EFFECT IN THE STABILITY OF A COMPOSITE HELICOPTER ROTOR BLADE*
63	***T07-2023067***	*DURABILITY OF A MORTAR CONTAINING SAND PLASTIC WASTE PVC TUBES*
64	***T07-2023068***	*NUMERICAL STUDY OF THE ELECTRICAL CHARACTERISTICS OF A NEW ALGAN/GAN MOSHEMT DESIGN ON 4H-SIC SUBSTRATE WITH QUATERNARY ALINGAN SPACER LAYER*
65	***T07-2023069***	*THE INFLUENCE OF SURFACE TREATMENT ON THE FIBER PHYSICAL AND THERMAL PROPERTIES*
66	***T07-2023071***	*DETERMINATION OF CARBON FIBER-REINFORCED POLYMER COMPOSITES BY ULTRASONIC*
67	***T07-2023073***	*THE OPTIMIZATION OF THE GEOMETRIC PARAMETERS OF COMPOSITE LAMINATE USING GENETIC ALGORITHM*
68	***T07-2023074***	*FREE VIBRATION ANALYSIS OF LAMINATED COMPOSITE PLATES REINFORCED WITH CARBON FIBERS IN THERMAL ENVIRONMENTS*
69	***T07-2023076***	*ANALYSIS OF THE DYNAMIC BEHAVIOR OF MAGNETORHEOLOGICAL ELASTOMER COMPOSITE: ELABORATION AND IDENTIFICATION OF RHEOLOGICAL PROPERTIES*
70	***T07-2023077***	*ANALYSIS OF HIGH VELOCITY OBLIQUE IMPACT ON HONEYCOMB SANDWICH PANELS WITH FGM SKINS*
71	***T07-2023079***	*SYNTHESIS AND CHARACTERIZATION OF NEW POLYMER COMPOSITE MATERIALS*
72	***T07-2023080***	*EXPERIMENTAL STUDY OF MECHANICAL BEHAVIOR IN SHEAR AND BENDING TEST OF SANDWICH PANELS*
73	***T07-2023081***	*MULTI-OBJECTIVES OPTIMIZATION OF COMPOSITE LAMINATE STRUCTURES USING NSGA-II AND FINITE ELEMENT ANALYSIS*
74	***T07-2023084***	*STUDY OF MECHANICAL BEHAVIOR OF A BIO-COMPOSITE MATERIAL*
75	***T07-2023085***	*DEVELOPMENT AND CHARACTERIZATION OF A COMPOSITE MATERIAL BASED ON EPOXY RESIN AND MINERAL FILLERS (SILICA)*
76	***T07-2023086***	*SYNTHESIS AND CHARACTERIZATION OF NANOMATERIAL (AG-OXIDE PILLAR/CLAY).*
77	***T07-2023087***	*BUCKLING ANALYSIS OF FUNCTIONALLY GRADED BEAMS USING THE DIFFERENTIAL QUADRATURE FINITE ELEMENT METHOD BASED ON REFINED BEAM THEORY*
78	***T07-2023161***	*COMPOSITE NANOARCHITECTONICS OF GRAPHENE OXIDE FOR BETTER UNDERSTANDING ON STRUCTURAL EFFECTS ON PHOTOCATALYTIC PERFORMANCE FOR METHYLENE BLUE*
79	***T07-2023177***	*STUDY OF THE EFFECT OF THE SHAPE FACTOR AND THE ORIENTATION ANGLE OF THE FIBERS ON THE STRESS CONCENTRATION FACTOR IN THE ORTHOTROPIC/ISOTROPIC PLATES OF AN AIRPLANE WING*

80	**T07-2023181**	*Study on impact behavior of composite sandwich with foam core*
81	**T07-2023193**	*THE EFFECT OF TEMPERATURE ON THE MECHANICAL CHARACTERIZATION OF BIO COMPOSITES*
82	**T07-2023219**	*ANALYSIS OF DAMAGE TO A 2024-T3 ALUMINUM STRUCTURE IN THE PRESENCE OF A V NOTCH REPAIRED BY COMPOSITE PATCH USING XFEM-CZM / XFEM-VCCT TECHNIQUES*
83	**T07-2023222**	*TENSILE PROPERTIES AND FRACTURE MECHANISM IN POLYAMIDE-12 NANOCOMPOSITES REINFORCED WITH GRAPHENE NANOPLATELETS AND NANOCLAY*
84	**T07-2023231**	*NUMERICAL ANALYSIS OF THE EFFECT OF FORCES ON THE CRACK IN A COMPOSITE PLATE IN ABAQUS SOFTWARE*
85	**T07-2023232**	*DAMAGE AND REPAIR OF COMPOSITE STRUCTURES*
86	**T07-2023260**	*EXPERIMENTAL CHARACTERIZATION OF COMPOSITE MAGNETORHEOLOGICAL ELASTOMER*
87	**T08-2023089**	*ANALYTICAL AND NUMERICAL RESOLUTION OF VISCOELASTIC UPPER-CONVECTED MAXWELL FLUID IN COUETTE FLOW WITH THERMAL EFFECTS*
88	**T08-2023090**	*INVESTIGATIONS ON THE WEAR BEHAVIOR OF ORGANIC MATRIX COMPOSITE MATERIALS IN DRY FRICTION.*
89	**T08-2023091**	*EFFECT OF O2 FLOW RATE ON THE STRUCTURE, WETTABILITY, TRIBOLOGY AND MECHANICAL BEHAVIOURS OF SPUTTERED ZR-O-N THIN FILMS*
90	**T09-2023092**	*OPTIMIZING OF DC MOTOR SPEED WITH INTERNAL MODEL CONTROL AND PID-FRACTIONAL ORDER APPROACH*
91	**T09-2023207**	*CONSTRAINED SOF FUZZY CONTROL OF QUAD-CAR ACTIVE SUSPENSION SYSTEM*
92	**T09-2023208**	*FUZZY NON-PDC CONTROL FOR ACTIVE SUSPENSION SYSTEM UNDER ACTUATOR SATURATION*
93	**T10-2023093**	*COOLİNG PERFORMANCE INVESTİGATİON OF PURE LOW-GWP REFRİGERANTS AS SUBSTİTUTES FOR THE PHASE-OUT R134A (1,1,1,2-TETRAFLUOROETHANE) İN COOLİNG SYSTEM : SEARCH FOR AN ADEQUATE REFRİGERANT*
94	**T10-2023094**	*HIGH-ORDER COMPACT NONLINEAR SCHEMES FOR SOLVING COMPRESSIBLE FLOWS*
95	**T10-2023096**	*NUMERICAL SIMULATION OF FLOW CHARACTERISTICS AROUND A ROTATING PROPELLER*
96	**T10-2023097**	*JOB SHOP SCHEDULING PROBLEM WITH BLOCKING AND NO_WAIT CONSTRAINTS*
97	**T10-2023098**	*Electrical signal processing for mechanical fault detection and diagnosis in asynchronous motor*
98	**T10-2023099**	*DEVELOPMENT OF A NATURAL GAS PIPELINE TRANSPORT SYSTEM (TSP-SONATRACH) USING GENETIC ALGORITHMS*
99	**T10-2023100**	*OPTIMIZING SHOP SCHEDULING THROUGH RESOURCE COORDINATION AND ROBUST STRATEGIES*
100	**T10-2023101**	*PROCESS OF EXTRACTING AN ORGANIC MATERIAL FROM CRUDE OIL*
101	**T10-2023158**	*EFFICIENT CYBERSECURITY PROTOCOLS FOR INDUSTRIAL SYSTEMS*
102	**T10-2023167**	*OPEN-PHASE FAULT DETECTION AND DISCRIMINATION IN A PERMANENT MAGNET SYNCHRONOUS MOTOR DRIVE SYSTEM*
103	**T10-2023401**	*DIABETIC RETINOPATHY DETECTION AND CLASSIFICATIONUSING VGG16 AND EFFICIENTNETB0*
104	**T10-2023402**	*L'ÉCOSYSTÈME DES PROJETS INNOVANTS (START-UP – PME)*
105	**T10-2023403**	*ENTREPRENEURSHIP IN THE SERVICE OF SCIENTIFIC RESEARCH VALUATION*
106	**T11-2023102**	*NANOFLUIDS AND HYBRID NANOFLUIDS: COMPARATIVE STUDY OF NATURAL CONVECTION IN A ROUND BOTTOM FLASK.*
107	**T11-2023103**	*COMPARATIVE STUDY OF HILL CLIMBING AND INCREMENTAL CONDUCTANCE MPPT TECHNIQUES FOR PV SYSTEMS*

108	***T11-2023104***	*NUMERICAL ANALYSIS OF THERMAL COMFORT IN VENTILATED ROOMS USING THE LATTICE BOLTZMANN METHOD*
109	***T11-2023105***	*NUMERICAL STUDY OF A DARRIEUS TANDEM WIND TURBINE WITH DOWNSTREAM BLADE DISPLACEMENT*
110	***T11-2023106***	*CARACTÉRISATION DE LA FRACTION INORGANIQUE DES PARTICULES ATMOSPHÉRIQUES DES ZONES INDUSTRIELLES (BEJAIA)*
111	***T11-2023107***	*STUDY OF THE PERFORMANCE OF A SELF-EXCITED ASYNCHRONOUS GENERATOR FOR AUTONOMOUS WIND POWER GENERATION*
112	***T11-2023108***	*PERFORMANCES ASSESSMENT OF AN INTEGRATED SOLAR COMBINED CYCLE SYSTEM POWERED BY GAS TURBINES AND PARABOLIC TROUGH COLLECTORS.*
113	***T11-2023109***	*MICROBIAL FUEL CELLS MFC FOR ELECTRICAL ENERGY*
114	***T11-2023110***	*AERODYNAMIC CHARACTERISTICS OPTIMISATION OF WIND TURBINE BLADE*
115	***T11-2023111***	*MICROWAVE AS PRETREATMENT METHOD FOR THE REDUCTION OF FFA FROM WASTE VEGETABLE OIL.*
116	***T11-2023112***	*WIND ENERGY CONVERSION CHAIN MODELING*
117	***T11-2023114***	*THE IMPORTANCE OF PASSIVE ENERGY EFFICIENCY TECHNIQUES IN REDUCING THE ENERGY CONSUMPTION OF BUILDINGS LOCATED IN A MEDITERRANEAN CLIMATE*
118	***T11-2023115***	*A COMPREHENSIVE STUDY ON WIND TURBINE FAULTS AND DIAGNOSIS METHODS*
119	***T11-2023116***	*STUDY OF THE EFFECT OF BUBBLE DIAMETER ON THE EFFICIENCY OF TWO-PHASE FLOW CENTRIFUGAL PUMPS*
120	***T11-2023117***	*NANOTECHNOLOGY AND ENERGY*
121	***T11-2023118***	*FENE- Dumbbell Model of Surfactants solutions in Microchannel*
122	***T11-2023119***	*FIRST-PRINCIPLES STUDY OF CUBIC CS-BASED PERVSKITES CSGEX3 (X=BR, CL AND F)*
123	***T11-2023120***	*MORPHOLOGICAL CHARACTERIZATION OF SB-DOPED SNO2 THIN FILMS: DOPING EFFECT*
124	***T11-2023121***	*RENEWABLE ENERGY TECHNOLOGIES*
125	***T11-2023122***	*PERFORMANCE DEGRADATION OF A PHOTOVOLTAIC PANEL with aging*
126	***T11-2023123***	*SOLAR ABSORPTION HEAT STORAGE SYSTEM*
127	***T11-2023124***	*THERMAL ANALYSIS OF LIQUID-SENSIBLE HEAT STORAGE UNITS FOR LOW-TEMPERATURE SOLAR APPLICATIONS*
128	***T11-2023125***	*ANALYZING THE INFLUENCE OF PARTIAL SHADING ON PHOTOVOLTAIC SYSTEM PERFORMANCE*
129	***T11-2023126***	*MULTICRITERIA DECISION SYSTEMS FOR SMALL SCALE DESALINATION UNIT POWERED BY HYBRID SYSTEMS*
130	***T11-2023127***	*EXPLORING NI-P, CO-NI, AND CO-NI-P CATALYSTS FOR ENHANCED HYDROGEN EVOLUTION REACTION IN SUSTAINABLE ENERGY APPLICATIONS.*
131	***T11-2023128***	*COMPARATIVE ANALYSIS OF SUPERCRITICAL CO2 AND AIR FLOW IN A CENTRIFUGAL COMPRESSOR*
132	***T11-2023129***	*A COMPARATIVE STUDY OF CONVENTIONAL MPPT TECHNIQUE P&O AND FUZZY LOGIC COLNTROLLER IN PHOTOVOLTAIC SYSTEM UNDER VARIABLE CONDITIONS*
133	***T11-2023130***	*COMPREHENSIVE NUMERICAL ANALYSIS OF AERODYNAMIC PERFORMANCE IN ASYMMETRIC PROFILES AND INFLUENTIAL FACTORS*
134	***T11-2023150***	*NUMERICAL INVESTIGATION OF ENHANCING TENGENTIAL FAN PERFORMANCE*
135	***T11-2023162***	*MODELING AND OPTIMIZING BATTERY REVENUES IN ELECTRICITY MARKETS*

136	**T11-2023170**	*CONTROL OF A PHOTOVOLTAIC SYSTEM CONNECTED TO POWER GRID USING DIRECT POWER CONTROL (DPC)*
137	**T11-2023179**	*NUMERICAL SIMULATION CONTRIBUTES TO THE THERMO-HYDRAULIC STUDY OF A HEAT EXCHANGER WITH HELICAL BAFFLES*
138	**T11-2023215**	*ANALYSIS OF THERMODYNAMICS AND ENVIRONMENTAL IMPACT OF DIFFERENT COMBINED CYCLE CONFIGURATIONS FOR GAS TURBINE APPLICATIONS*
139	**T11-2023216**	*SYMMETRY BREAKING IN ONE DIMENSIONAL BIN-PACKING PROBLEM*
140	**T11-2023241**	*COMPARATIVE STUDY BETWEEN TWO APPROCHES CFD AND BEM TO INVESTIGATE THE WIND TURBINE PERFORMANCE*
141	**T11-2023253**	*EXPERIMENTAL ANALYSIS OF A LOW-GRADE HEAT DRIVEN EJECTOR REFRIGERATION INSTALLATION*
142	**T11-2023264**	*STUDY OF THE THERMAL BEHAVIOR OF A WALL CONTAINING TEXTILE INSULATION INCORPORATING PHASE CHANGE MATERIALS*
143	**T13-2023131**	*PRODUCTION OF GREEN HYDROGEN BY WATER SPLITTING USING A NI-W ELECTRODES*
144	**T13-2023132**	*NUMERICAL STUDY OF METHANOL STEAM REFORMING FOR HYDROGEN PRODUCTION (FUEL CELLS)*
145	**T13-2023133**	*A CASE STUDY OF A STANDALONE WIND/HYDROGEN SYSTEM*
146	**T13-2023134**	*EFFECT OF RECYCLED GRAVEL ON THE DURABILITY OF SELF-COMPACTING CONCRETE WITH DOUBLE-HOOK STEEL FIBER*
147	**T13-2023151**	*FEASIBILITY STUDY OF A CENTRAL RECEIVER CONCENTRATED SOLAR POWER PLANT FOR GREEN HYDROGEN PRODUCTION IN ALGERIA.*
148	**T14-2023135**	*EXPERIMENTAL AND FACTORIAL DESIGN OF THE PHYSICAL PROPERTIES OF CONCRETE MIXED WITH RUBBER AND PLASTIC WASTE*
149	**T14-2023136**	*COMPREHENSIVE ANALYSIS OF WASTE FOUNDRY SAND AS A HOLISTIC SUBSTITUTE FOR NATURAL SAND IN CONCRETE*
150	**T14-2023137**	*THERMOMECHANICAL BEHAVIOR OF A COMPOSITE MATERIAL UNDER BENDING LOADS*
151	**T14-2023154**	*PERFORMANCE EVALUATION OF RC FRAMES RETROFITTED USING RC JACKETED COLUMNS*
152	**T14-2023191**	*THERMAL BEHAVIOR OF STEEL COLUMN*
153	**T14-2023245**	*THE IMPACT OF POROSITY DISTRIBUTION ON THE BENDING OF POROUS FUNCTIONALLY GRADED SQUARE PLATE UNDER A UNIFORM LOAD*
154	**T15-2023139**	*APPLICATION OF INTELLIGENCE ALGORITHMS TO A GROUP OF ROBOTS*
155	**T15-2023141**	*ENHANCED HUMAN-ROBOT INTERACTION THROUGH HAND DETECTION*
156	**T15-2023142**	*DESIGN AND IMPLEMENTATION OF A PROTOTYPE INTELLIGENT SYSTEM USING TINY-MACHINE LEARNING FOR MONITORING A GAS TURBINE*
157	**T15-2023143**	*NEW STATE FEEDBACK CONTROLLER OF TS FUZZY SYSTEMS WİTH UNMEASURED PREMİSE VARİABLES: APPLİCATİON TO SİNGLE-LİNK FLEXİBLE JOİNT ROBOT*
158	**T15-2023144**	*ARTIFICIAL INTELLIGENCE IN EARTH SCIENCES FOR POROSITY PREDICTION IN PETROLEUM RESERVOIR FROM GEOPHYSICAL WELL-LOGS DATA. APPLICATION TO ALGERIAN SAHARA*
159	**T15-2023145**	*CONTROL AND DIAGNOSTICS OF ROTATING MACHINES USING ARTIFICIAL INTELLIGENCE ALGORITHMS*
160	**T15-2023147**	*NONLINEAR SYSTEM STATE ESTIMATION WITH UNMEASURABLE PREMISES: A NOVEL APPROACH USING LINE INTEGRAL LYAPUNOV FUNCTION*
161	**T15-2023163**	*DESIGN AND EVALUATION OF A DECOUPLED UNKNOWN-INPUT OBSERVER FOR THE SYNCHRONOUS RELUCTANCE MOTOR USING TAKAGI-SUGENO FUZZY REPRESENTATION*

SUMMARY

162	***T15-2023166***	*USING GRAMMER AND SINGER DIRECT MULTI-CLASS SVM FOR SHORT-CIRCUIT FAULTS DETECTION AND DISCRIMINATION IN HIGH VOLTAGE POWER LINES.*
163	***T15-2023174***	*REAL-TIME IMPLEMENTATION OF A FUZZY-PID CONTROLLER FOR A HELICOPTER SYSTEM*
164	***T16-2023149***	*A NEW ADVANCED OXIDATION PROCESS FOR THE DEGRADATION OF EMERGING ORGANIC POLLUTANTS*
165	***T01-2023029***	*MODILISATION OF ELECTRON-MATTER INTERACTION: SHORTRANGE POTENTIAL EFFECT IN THE INITIAL STATE*
166	***T01-2023172***	*ENHANCING LUBRICANTS USING GRAPHITE NANOPLATES*
167	***T07-2023078***	*THE MECHANICAL PROPERTIES OF AN UNSATURATED POLYESTER COMPOSITE REINFORCED WITH HALFA FIBERS ARE EXAMINED IN RELATION TO THE ADDITION OF MARBLE POWDER AND ITS CHEMICAL TREATMENT*
168	***T02-2023043***	*FINITE ELEMENT SIMULATION OF ELASTIC CONTACT PROBLEM*
169	***T07-2023088***	*TENSILE BEHAVIOR AND STATISTICAL ANALYSIS OF NEW NATURAL FIBERS AS POTENTIAL REINFORCEMENT FOR INDUSTRIAL POLYMER BIOCOMPOSITES*
170	***T01-2023247***	*CHARACTERIZATION OF THE MECHANICAL PROPERTIES OF A WELDED JOINT BETWEEN TWO (02) DISSIMILAR MATERIALS.*
171	***T16-2023148***	*ANALYSE OF THE RELIABILITY AND AVAILABILITY OF THE ALGIERS METRO TRACTION SYSTEM*
172	***T06-2023064***	*NON-DESTRUCTIVE CHARACTERIZATION OF ALFA/PLA BIO-COMPOSITE USING IMPULSE EXCITATION TECHNIQUE (IET)*
173	***T01-2023027***	*THE CREATİON OF AN ELECTROCHEMİCAL SENSOR THAT RELİES ON A COMPOSİTE MATERİAL COMPOSED OF P2MTH/ MWCNTS /NPS*
174	***T11-2023241***	*COMPARATIVE STUDY BETWEEN TWO APPROCHES CFD AND BEM TO INVESTIGATE THE WIND TURBINE PERFORMANCE*
175	***T02-2023040***	*PREDICTION OF CHATTER STABILITY OF THIN-WALLED PARTS CONSIDERING VARIATION OF DYNAMIC CHARACTERISTICS BASED ON SURFACE ROUGHNESS MEASUREMENT*
176	***T10-2023153***	*IMPROVING THE PERFORMANCE OF HIGH-VOLTAGE DIRECT CURRENT (HVDC) ELECTRICAL POWER TRANSMISSION SYSTEMS USING THE MODULAR MULTILEVEL MULTICELL CONVERTERS*
177	***T01-2023031***	*EFFECT OF TREATED NANOCLAYS ON THE MECHANICAL PROPERTIES OF POLYPROPYLENE/POLYAMIDE66 NANOCOMOPOSITES*
178	***T02-2023045***	*OPTIMIZATION OF CONTACT SURFACES IN SHRINK-FIT ASSEMBLIES OF THIN-WALLED CYLINDERS*
179	***T01-2023176***	*CHARACTERIZATION OF ALGERIAN PHOSPHATE MARLES REJECTS OF DJEBEL ONK TEBESSA*
180	***T01-2023004***	*CHARACTERIZATION OF MARL REJECTS FROM EXPLOITATION OF EL -OUENZA IRON MINE*

VALORIZATION OF WASTE PALM FIBER AND USE AS REINFORCEMENT IN BIOCOMPOSITE MATERIALS

Nedjla Debabeche1

Laboratory of Applied Chemistry LCA, University of Biskra, Biskra, Algeria

Abstract

The good compatibility interfacial adhesion in composite materials makes the properties exciting, such as lightweight, high strength, corrosion resistance, withstands high temperatures, stiffness, and are easier to form in the industrialization process than traditional materials In this research, palm fibers has been used to reinforce polypropylene (PP) with a loading rate from 10 to 30%, to open up further possibilities in waste management. The fibers were treated with 5% alkaline (NaOH) solution for 30 min as well as 3% methacrylic acid solution for 1hour (AA) to modify the fiber properties. Therefore, the modification effectiveness demonstration was examined by FTIR analysis. Also, effect of different fiber treatment on the composite properties were investigated. Results illustrate that chemical modification has a great effect on the fiber–matrix interactions, were the new composite version enhancement is evident from multiple tensile properties.

Keywords:*Interfacial adhesion, Polypropylene, Date palm fiber, Alkaline treatment, Mechanical properties.*

Corresponding author's:nadjela.debabeche@univ-biskra.dz
sciencesconf.org:ncmm2023: T01-2023002

STRUCTURAL AND UV-VISIBLE ABSORPTION, PHOTOLUMINESCENCE PROPERTIES OF SQUARE-PLANER NICKEL(II) COMPLEXES

Oumnia Racha SELMI 1, Hanane DJOUAMA 1, Rabie DJOUAMA 2

1 Applied Chemistry Laboratory, Faculty of Sciences, Chemistry Department, University of Mohamed Khider, Biskra, Algeria. 2 LCPM Laboratory, Faculty of Sciences, Chemistry Department, University of Oran 1 Ahmed Ben Bella, Oran, Algeria.

Abstract

The square-planar Ni (II) compounds show unexpectedly strong photoluminescence, with the emission mainly caused by a fluorescent ligand. In this work, a series of alkynyl-nickel (II) complexes with bidentate phosphine ligands and different substituents were studied using DFT-based quantum calculations. The 1,2-bis(di-n-pyridylphosphino) ethane (Dppe) ligand was modified; the pyridyl groups were replaced by the azine groups in order to determine the effect of the increase in nitrogen on the structural and optical properties. The results of the DFT and TD-DFT calculations of the singular and triplet states of molecular geometry were used to evaluate the factors influencing the emission energy. These new theoretical data of increasing interest are a considerable help for the advancement of luminescent models.

Keywords:*DFT, TD-DFT, Nickel, square-planer, absorption spectra, luminescent..*

Corresponding author's:oumniaracha.selmi@univ-biskra.dz
sciencesconf.org:ncmm2023: T01-2023003

HOMOGENIZATION TECHNOLOGIE TO ACHIEVE NUMERICAL ESTIMATION OF MULTI MATERIAL MECHANICAL BEHAVIOR IN MICROELECTRONICS

Douaa KHELLADI*1, Amer MECELLEM 1, Imad ELFATMI1, Soufyane BELHENINI1

1Smart Structures Laboratory, University of Ain Temouhent , Algeria

Abstract

The homogenization method is presented as a promising approach to simplify the initial complex structure of the microcomponent into an equivalent simple structure. However, Knowledge of the mechanical properties of materials is essential for the design and manufacture of technical devices. In order for the technical object to fulfil its overall function and withstand the various stresses it undergoes, it is important to select the appropriate materials. Subsequently, the proposed method is applied to 3D model composed of three diffrent materials was proposed by using finit element software, such as ABAQUS CAE, applied to it periodic boundary conditions in several phases -Tensile, Compression, Shear- This study focuses on the comparison between the homogenized behaviour and the a full model behaviour. Therfore, a good agreament is observed between those two, thus our approach is reliable.

Keywords:*Multi-Material, Abaqus, Periodic boundry condition, 3D modelling, Homogenization, Finite element modeling.*

Corresponding author's:douaa.khelladi@univ-temouchent.edu.dz
sciencesconf.org:ncmm2023: T01-2023005

LABORATORY OF PHYSICS OF EXPERIMENTAL TECHNIQUES AND ITS APPLICATIONS, UNIVERSITY OF MEDEA, ALGERIA.

DEHIMI Nour El Houda 1* , DEHBAOUI Mourad 1 and DJENNANE Khaoula 1

1 Laboratory of Physics of Experimental Techniques and its Applications, University of Medea, Algeria.

Abstract

In this work, three Fe-based Heusler alloys Fe2ZrZ (Al, Ga and In) have been studied by first-principles calculations. On that, Fe2ZrGa and Fe2ZrIn are being investigated for the first time. These compounds were characterised by calculating lattice parameters, elastic constants, electronic band structures, majority and minority spin polarized density of states (DOS) as well as total and atomic magnetic moments. The calculated elastic constants confirm that all compounds are mechanically stable. The elastic constants are also used to calculate bulk modulus, shear modulus, Young's modulus, Pugh's ratio, Young's modulus and isotropic factor. Furthermore, Fe2ZrAl, Fe2ZrGa and Fe2ZrIn alloys showed a nearly half-metallic character with a high polarisation of 73%, 84% and 91%, and magnetic moments of 0.83μB, 0.88μB and 0.92 μB respectively. These results are expected to improve the integration of Fe-based full Heusler alloys into spintronic devices.

Keywords:*Fe-based, polarisation, Full-Heusler, magnetic moments, Spintronic..*

Corresponding author's:houdadehimi1@gmail.com
sciencesconf.org:ncmm2023: T01-2023006

STARCH NANOPARTICLES PREPARATION VIA A SIMPLE NANOPRECIPITAION TECHNIQUE

Lila BELMAHDI, Djamila OUKACHA, Malika MAKHLOUFI

Laboratoire de Physique et Chimie des Matériaux (LPCM), Faculté des sciences, Université Mouloud Mammeri, Tizi-Ouzou, 15000, Algeria

Abstract

Starch is an abundant, renewable and biodegradable biopolymer produced by all green plants. The most starches in the native form present numerous limitations, hence, nano sized starch particles have attracted much attention in many fields of research due to their unique properties. The present study aims to develop starch nanoparticles (SNPs) via a simple nanoprecipitation technique. A non-toxic, eco-friendly and inexpensive solvent was used to dissolve starch. The obtained SNPs were characterized by dynamic light scattering (DLS), X-ray diffraction (XRD) and Fourier transform infrared spectroscopy (FT-IR). The results showed that particles with a mean size diameter of 262 nm and a polydispersity index of 0,372 were obtained. XRD analysis demonstrated their amorphous nature, while FT-IR spectroscopy indicated that no change in the chemical structure of SNPs occurred. Accordingly, the developed SNPs hold promise for diverse applications in industries such as food, pharmaceuticals, cosmetics, materials and more.

Keywords:*Starch, Nanoparticles, Nanoprecipitaion..*

Corresponding author's:lilabelmahdi@gmail.com
sciencesconf.org:ncmm2023: T01-2023010

HETEROGENOUS FENTON-LIKE DEGRADATION OF METHYLENE BLUE IN PRESENCE OF MAGNESIUM FERRITE NANOPARTICLES

Abdennour HEBBAZ 1, Mehdi BELHANI 1 AND Tarek TAHRAOUI 1

Mining, metallurgy and materials laboratory (L3M), National Higher School of Technology and Engineering (ENSTI), Annaba, Algeria.

Abstract

Magnesium ferrite (MgFe2O4) was successfully synthesized by an inexpensive coprecipitation method. The photocatalytic activity under sunlight irradiation was studied to measure the photocatalytic performance. The structural, morphological, and optical properties of prepared samples were investigated by X-ray Powder Diffraction (XRD), Scanning Electron Microscopy (SEM-EDX), Brunauerr-Emmet-Teller (BET), UV-visible spectrophotometer. It was found from the DRX diagram that the crystallin size of the MgFe2O4 sample to be 12.098 nm, and a specific surface area of about 57.23 m2/g, with an irregular particle shapes, will the UV-vis spectroscopy data reveal that the optical band gap is about 2.50 eV. The maximum photocatalytic degradation of Methylene blue under sunlight irradiation was achieved for the MgFe2O4 (35.23%) in absence of hydrogen peroxide and presence of hydrogen peroxide the degradation achieve 88.02% within

Keywords:*Magnesium Ferrite; Coprecipitation; Fenton-Like; Photocatalytic activity; Sunlight..*

Corresponding author's:a.hebbaz@ensti-annaba.dz
sciencesconf.org:ncmm2023: T01-2023011

OPTIMIZATION OF SAND CONCRETE PERFORMANCE VIA MIXTURE DESIGN METHOD

Ben Salah HADJI 1,Mostefa Hani 1 and 2

1 Department of Civil Engineering, Ziane Achour University of Djelfa, Algeria. 2 Department of Civil Engineering, Eskisehir Technical University, 26555, Eskisehir, Türkiye.

Abstract

There is a lack in the design modeling approaches application in the material and mechanical domains of civil engineering. For this reason, this study aims to develop a mathematical model for predicting the impact of mineral additives on the mechanical properties of sand concrete (SC). The statistical analysis software JMP7, provided by SAS, was utilized for this purpose. A mixture design modeling approach optimizes sand concrete mixtures without many experiments by replacing cement with silica fume (SF) and Dune sand grind (DSG) in proportions up to 20%. A total of twenty-one sand concrete mixtures are generated by the utilization of this analytical technique in both binary and ternary systems to evaluate the compressive strength (CS) at 7 and 28 days. The results indicate that derived models based on an experimental design approach effectively explain interactions between mixture parameters. The mathematical models show strong correlation coefficients (R^2= 0.90 and 0.92 for a CS at 7 and 28 days, respectively) for all studied responses. In comparison to the reference sand concrete SC21, the binary mixture SC15 and ternary mixture SC18, which incorporate additives SF and DSG, exhibit notably enhanced mechanical strength.

Keywords:*Sand concrete (SC) , Mixture design modeling approach (MDM) , Silica fume (SF) , Dune sand grind (DS) , Mechanical strength..*

Corresponding author's:b.hadji@univ-djelfa.dz
sciencesconf.org:ncmm2023: T01-2023012

FIRST-PRINCIPLES INVESTIGATION OF STRUCTURAL, ELECTRONIC, ELASTIC, THERMODYNAMIC, OPTICAL, AND THERMOELECTRIC PROPERTIES OF MGSNO3 PEROVSKITE COMPOUND

Sabir Makhlouf, Malika Labidi, Abdelaziz Amara

Department of Physics, LEREC Laboratory, Badji Mokhtar University, Annaba, Algeria

Abstract

Our research aims to contribute to the broader understanding of the MgSnO3 material and showcasing its potential applications. We studied theoretically the Structural, Electronic, Elastic, Thermodynamic, Optical and Thermoelectric properties of MgSnO3 perovskite compound, using (FP-LAPW) method based on (DFT) integrated into the Wien2k code. The (PBE-GGA) has been used for optimization constant of lattice which is found to be 4.02 Å and the calculations indicated a negative formation energy and stability for MgSnO3 in cubic space group 216 (F-43m) structure. The electronic properties using SCF calculation and modified Becke and Johnson (mBJ), represented by BS, PDOS and TDOS, revealed MgSnO3 is a semi-conductor with an indirect bandgap of 3.26 eV in (Γ-M). We have observed a significant contribution in this energy gap from O-p state. The important optical coefficients such as electrical conductivity, reflectivity, absorption coefficient, and refractive index are presented within an energy range of 0-14 eV. Also, debye temperature, constant-volume heat capacity and entropy are calculated from 0 to 500 K using Gibbs2 method. Finally, utilizing Boltzmann's quasi-classical theory, we probed thermoelectric properties including the Seebeck coefficient, conductivity, and figure of merit (ZT). We found a high ZT value of 0.998 at a temperature of 400 K.

Keywords:*DFT, Wien2k, Thermoelectric, Optical, MgSnO3, perovskite*..

Corresponding author's:sabir.makhlouf@gmail.com
sciencesconf.org:ncmm2023: T01-2023013

X ray diffraction study of structural properties of Fe86Cr14 mechanical alloys, Effect of process control agent

Mohammed Elamine Ayad*1, Hemmous Messaoud1, Abderrahim Guittoum1, and Reguia Belkofsi1

Nuclear Research Centre of Algiers

Abstract

Fe-14%Cr nanoparticles with different PCA content (Acetone, Methanol and Ethanol) were elaborated by mechanical ball milling process during 72 h at room temperature. The PCA has been included in the Fe-14%Cr matrix with 5 wt.% of the total mass of each sample. From x-ray diffraction analysis indicated the formation of bcc and Trigonal phases, the lattice parameter remained constant while the grain size D changed with changing on the different of PCA.

Keywords:*Mechanically alloying materials, ball milling process, process control agent, X ray diffraction, structural properties.*

Corresponding author's:m.ayad@crna.dz
sciencesconf.org:ncmm2023: T01-2023014

A NOVEL C0 STRAİN BASED FİNİTE ELEMENT FOR STATİC ANALYSES OF FUNCTİONALLY GRADED PLATES

Taqiyeddine Assas1*, Messaoud Bourezane 2, Madjda Chenafi 3, Seyfeddine Benabid 4

1,2,3 LAHE Laboratory, Faculty of Science and Technology, Biskra University, Biskra, Algeria
4 LARHYSS Laboratory, Faculty of Science and Technology, Biskra University, Biskra, Algeria

Abstract

The static bending of functionally graded material (FGM) plates is examined by altering the volume proportion of the ceramic and metallic elements using a simple power law distribution. The deflection and stresses are estimated numerically using a four-node quadrilateral finite element called QSBP20 (Quadrilateral Strain-Based Plate with 20 degrees of freedom) created by Belounar et al. This element is created by superimposing two strain-based elements, the first being a membrane based on the strain approach with two (U, V) degrees of freedom per node and the second being a Reissner-Mindlin plate based on the FSDT with three (w, θ_x, θ_y) degrees of freedom per node at each of the four corner nodes. To simplify the issue and prevent membrane-bending coupling, the idea of the neutral surface position is developed. The current model's comparison with existing literature is full and determined to be logical. For the current task, in-house MATLAB code has been built. The parametric research is being conducted to investigate the influence of the side-to-thickness ratio, aspect ratio, thickness, and volume fraction index on stresses and transverse displacements

Keywords:*Strain based • Static Bending • FGM plate• Finite element . Reissner-Mindlin plate.*

Corresponding author's:taqiyeddine.assas@univ-biskra.dz
sciencesconf.org:ncmm2023: T01-2023015

THEORETICAL AND EXPERIMENTAL INVESTIGATION OF HYDROXYAPATITE CERAMIC

Chams Edoha LABIDI 1, Oum Keltoum KRIBAA 2,Rabie DJOUAMA 3, Hanane DJOUAMA 2

1 Molecular chemistry and environment Laboratory,University of Mohamed Khider, Biskra, Algeria, 2 Applied Chemistry Laboratory, University of Mohamed Khider, Biskra, Algeria. 3 LCPM Laboratory, University of Oran 1 Ahmed Ben Bella, Oran, Algeria.

Abstract

Hydroxyapatite Ca10(PO4)6(OH)2 also known as (Hap) is a biomaterial with superior biocompatibility and bioactivity due to similarities with the mineral phase of bones and teeth. It is widely used in medical fields such as organ transplants, drug delivery systems, and implants to replace amputated bone in tissues. The crystalline microstructure of hydroxyapatite is hexagonal with the following lattice parameters (a=b=9.4260Å, c=6.8850Å) and space group P63/m. It has a regular spherical porous surface particle morphology. Density functional theory (DFT) is the basis of quantum chemistry and is an important tool for understanding structural configurations and explaining complex physical and chemical properties. The primary focus of this work is the synthesis of hydroxyapatite using the double-decomposition method. The fine powders were characterized using a variety of analytical techniques, including scanning electron microscopy, X-ray diffraction, and infrared spectroscopy, and density measurement The geometry of the complex isolated using density functional theory (DFT) method was optimized in open air and in various solvents. TD-DFT calculations were carried out in order to obtain the UV−visible absorption spectra of the complex and to determine the excitation energies and the associated oscillator forces of the studied complex, in order to deduce their electronic spectra. The GaussView and Origin software packages were used to obtaine the theoretical absorption spectra.

Keywords:*Hydroxyapatite, Biomaterial, Microstructure, DFT, TD-DFT..*

Corresponding author's:chamsedoha.labidi@univ-biskra.dz
sciencesconf.org:ncmm2023: T01-2023017

HARD MATERIALS POLISHING USING CERIUM OXIDE

Djouda LAADJEL1, Nabil BELKHIR1

1Applied Optics laboratory ,Institute Of Optics and Precision Mechanics,Ferhat Abbas University 1

Abstract

Certain special materials, such as transparent ceramics, sapphire, or glass-ceramics, are increasingly being used in the optical field, posing a significant challenge for manufacturing as well as other performance parameters. It is these same performance characteristics that make them highly desirable for use in challenging environments. Nevertheless, manufacturing optical components from hard materials presents a considerable difficulty.In this study, optical surfaces made of hard materials (transparent ceramics, sapphire, or glass-ceramics) were polished under various conditions and parameters (cerium oxide as a slurry, polyurethane used as a polishing pad) with high velocity , and the surfaces were characterized. Throughout the process, the influence of polishing parameters on the quality of optical surfaces was investigated. Dissolution rate, roughness, and optical transmission were measured, and the results were discussed.A high-quality surface is obtained, with few micro-scratches or damage, and a very smooth and better surface roughness. However, the polishing time is extremely long compared to the pol-ishing of optical glasses such as flints and crowns usually used as optical components. The results obtained allow us to conclude that the polishing solution and the hardness of the sam-ples considerably influence the surface quality.

Keywords:*Hard Materials, Polishing, Material Removal, Roughness.*

Corresponding author's:djoudalaadjel10@gmail.com
sciencesconf.org:ncmm2023: T01-2023018

THE APPLICATION OF ANALYTICAL TECHNIQUES FOR A COMPREHENSIVE UNDERSTANDING OF GLAZE CERAMIC COMPOSITIONS AND STRUCTURES

Imene Boussaha, Zahra Hamidouche Malou, Mohamed Hamidouche
Emerging Materials Research Unit

Abstract

The production of high-quality ceramic coatings reveals the importance of unique, high-quality and aesthetically pleasing properties that meet the needs of local markets. By supporting the local economy, it contributes to expanding ceramic activities in the region by exploiting local raw materials.By optimizing combinations of elements and elemental fractions, it is possible to achieve optimum results in the production of ceramic coatings. This optimization is achieved by using the results of elemental characterization and incorporating advanced science and expertise in special elements and desired physical and aesthetic properties.Producing ceramic glazes involves combining different ingredients, developing recipes, mixing proportions carefully and following precise firing steps. It is crucial to master the chemical reactions that occur during firing and the physical and aesthetic properties required to achieve optimum results. Ceramists can experiment with different proportions of ingredients, set precise firing temperatures and apply layering techniques to achieve unique, personalized results.
The objective of this study is to determine the necessary adjustments to the mixtures of raw materials based on the characterization results obtained on these initial materials. This will enable the formulation of locally manufactured glazes to be optimized , By adopting these strategies, local economies can successfully thrive and contribute to regional and national development.

Keywords:*Ceramic glazes, production, raw materials, formulation, firing..*

Corresponding author's:imenboussaha46@gmail.com
sciencesconf.org:ncmm2023: T01-2023019

THE STRUCTURAL AND ELECTRONIC PROPERTIES OF BROOKITE TIO2: A FIRST–PRINCIPLES STUDY FIRST-PRINCIPLES STUDY

Hadjer MEZIANI1,2, Seddik El Hak ABAIDIA1,2 and Nadia NEHAOUA 1,2, Farouk MEBTOUCHE1,2

1Departement of physics, Faculty of science, University of M'Hamed Bougara, Boumerdes-Algeria. 2 Laboratory of Coatings, Materials, and Environment (LRME), Mhamed Bougara Universty of Boumerdes (UMBB), Algeria.

Abstract

In this study, we have studied the structural and electronic properties of the Brookite TiO2, which crystallize in the structure orthorhombic and belong to the group Pbca. We used the ab-initio calculation method, which is that of the pseudopotential and plane waves (PP-PW) in the framework of the density functional theory (DFT) and implemented in the Quantum expresso, by processing the Exchange energy and correlation by the approximation of the generalized gradient (GGA-PBEsol), we have first calculated the lattice parameters (a, b and c) of the bulk of the brookite structure and we also discussed the electronic properties: band structure, total and partial electronic density diagrams (TDOS and PDOS).

Keywords:*TiO2, brookite, DFT, electronic properties..*

Corresponding author's:h.meziani@univ-boumerdes.dz
sciencesconf.org:ncmm2023: T01-2023020

STUDY OF PHOSPHORUS, NITROGEN AND ARSENIC DOPED GERMANIUM

Amar KACI, Karima HAMMOUM

STRUCTURAL MECHANICS AND ENERGETICS LABORATORY, Mouloud Mammeri University of Tizi Ouzou

Abstract

In this study, we are examining the implantation of nitrogen, phosphorus, and arsenic ions into a germanium target using the SRIM software (Stopping and Range of Ions In Matter). Our main objective is to analyze the various phenomena associated with ion implantation and the interaction between these ions and the material. Therefore, we have determined the distribution profiles of the implanted ions for the three types of dopants, at various implantation energies (10, 100, and 180 keV).

Keywords:*ion implantation, germanium, nitrogen, phosphorus, arsenic, interactions, SRIM software..*

Corresponding author's:kaciamar126@gmail.com
sciencesconf.org:ncmm2023: T01-2023021

EXPERIMENTAL EVALUATION OF LIGHTWEIGHT FOAM CONCRETE USED IN THERMAL INSULATION OF BUILDING

Abdelouahab BOUTTOUT, Amina SLYEMI

National Center of Building Integrated Studies and Researches, CNERIB Cité Nouvelle El-Mokrani, Souidania, 16097, Algeria .

Abstract

This work is devoted to study the mechanical and thermal properties of lightweight foam concrete used in insulating buildings. The thermal insulators tested have good thermal insulation properties. The thermal tests were carried out at our center (National Center of Building Integrated Studies and Research). The results of the thermo-physical characterization of foam concrete revealed the following thermal conductivity: 0.10 W/m.K when using a flux-meter device, and 0.09 W/m.K when using a CT-meter device.The effect of density on thermal conductivity and mechanical proprieties are studied in detail in this paper. The mechanical compression tests have been carried out both before and after immersion in water. The compressive strength of foam concrete exceeded 1 MPa. In addition, the UPV test (Ultrasonic Pulse Velocity) has also been conducted on different samples. The results of the measurements obtained are in agreement with the results of measurements from international laboratories such as the laboratory of the Scientific and Technical Center for Building (CSTB), the CERIB laboratory and the Lafarge laboratory.
This material can be used to enhance the thermal rehabilitation of buildings and contribute to strengthening the national housing program in Algeria.

Keywords:*Thermal insulation, foam concrete, mechanical strength, thermal conductivity, UPV.*

Corresponding author's: Bouttout@gmail.com
sciencesconf.org:ncmm2023: T01-2023022

EFFECT OF RECRYSTALLIZATION ONTHE MECHANICAL PROERTIES OF COLD ROLLED X38 STEEL

Fethia BOUAKSA 1

University of Science and Technology of Oran Mohamed BOUDIAF Faculty of Mechanical Engineering - Department of Mines and Metallurgy LSCMI Laboratory: Composite Structures Innovative Materials

Abstract

This work aims to study the evolution of the mechanical and structural properties of X38 steel deformed by cold rolling and recrystallization annealing at 820°C. Optical microscopy and micro Vickers hardness are the main analysis techniques used to monitor structural evolution and mechanical properties during the different stages of rolling. The results obtained confirm the notable influence of the deformation rate on the size of the recrystallized grains.

Keywords:*Cold rolling, recrystallization, Grains, X 38.*

Corresponding author's:fbouaksa@yahoo.fr
sciencesconf.org:ncmm2023: T01-2023024

NUMERICAL OPTIMIZATION OF THE DEEP DRAWING OPERATION OF DC04 STEEL SHEET

Faouzi HAMZA1, Ouzine BOUSSAID2, Hamid HAMADACHE3, Abdelmoumene GUEDRI4

1Department of Mechanical Engineering, Badji Mokhtar University of Annaba, Algeria. 2 Research on industrial risks, control and safety Laboratory, Badji Mokhtar University of Annaba, Algeria. 3Advanced Technology in Mechanical Production (LRATPM) Laborat

Abstract

The aim of this work is to optimize the deep drawing operation of DC04 steel sheet, in order to avoid a problem of rupture preceded by the appearance of necking on drawn parts, produced in a forming workshop of a manufacturing company. A 3D numerical simulation explicit model of the forming operation was performed by the finite element calculation code Abaqus/CAE. With the process simulation, we can identify, evaluate and solve industrial problems. Where, the tests can be carried out without time-consuming and costly workshop intervention. An incremental approach by a series of univariate tests and from the numerical results we have determined the influence degree of each factor. The common optimal levels of the deep drawing parameters respectively the punch speed and the die radius are obtained after combinations of the different levels of these two factors, using FEM. The mathematical modeling of the deep drawing process carried out according to the chosen experimental design, allows us to predict the effect of parameter levels on the steel DC04 sheet material behavior to plastic strain in the studied field.

Keywords:*Optimization, Numerical simulation, Deep drawing, DC04 steel sheet, Plastic strain.*

Corresponding author's:faouzi-hamza@hotmail.fr
sciencesconf.org:ncmm2023: T01-2023025

OPTIMIZING OF ANTIREFLECTIVE COATINGS: A SIMULATION STUDY USING TiO2 AND SiO2 DEPOSITIONS

Asma YOUSFI 1(*), Abdellah CHORFA 1

1 Applied optics laboratory, Institute of Optics and Precision Mechanics, University of Ferhat Abbas, Sétif1, Algeria.

Abstract

Over the past few years, antireflective (AR) coatings have attracted much attention. AR coatings are thin films applied to optical surfaces to reduce reflection and increase transmission of light. These coatings are commonly used on ophthalmic lenses, camera lenses, solar cells, and other optical elements to improve the efficiency and performance of the optical system. The key purpose of AR coatings is to minimize the amount of light that is reflected at the surface of an optical component, thereby enhancing the amount of light that is transmitted through it. In this work, we chose a glass substrate with a refractive index of 1.5 and applied titanium oxide (TiO2) and silicon oxide (SiO2) for deposition, while using the open-source software "OpenFilters" to simulate the antireflective filter. We investigate the influence of the number of layers in the AR coating, specifically double and triple layers, on reflectance and transmittance. Furthermore, we compare the behavior of incident light beams striking a triple layer AR coated glass at different angles.

Keywords:*Antireflective, Coating ,Layer, Reflectance, Transmittance..*

Corresponding author's:ayousfi256@gmail.com
sciencesconf.org:ncmm2023: T01-2023026

EFFECT OF ROTARY FRICTION WELDING (RFW) PARAMETERS ON STRAIN HARDENING BEHAVIOR OF AUSTENITIC STAINLESS STEEL JOINTS.

Hicham BOUCHAREB 1, Samir HARITI 1 et Taoufik BOUKHAROUBA1

1Laboratoire de Mécanique Avancé (LMA), USTHB, BP 32 Bab Ezzouar, 16111 – ALGER

Abstract

The objective of this work is to analyse the work hardening behaviour for AISI 304 and AISI 316 austenitic stainless steels after characterization of rotary friction welding operations carried on these two metals, separately (similarly) then combined (mixed welding). The stress–strain curves of welded joints were analysed in terms of Ludwik, Hollomon, Swift and Ludwigson equations to modeling work hardening behaviour and to determine work hardening exponent values. For the two welded joints AISI 304 - AISI 304 and AISI 304 - AISI 316, the Swift's law gives better predictions compared to the other Laws. Moreover, these two joints are manifested by a greater decrease in mechanical properties and a high hardening capacity. Also, their work hardening behaviour has completely changed, resulting in the existence of a single work hardening stage; therefore, the base metal AISI 304 has more influence on the work hardening behaviour for a dissimilar welded joint. For the welded joint AISI 316 - AISI 316 Ludwigson's law better describes the work hardening behaviour. This welded joint is characterized by quite similar mechanical properties to base metal. The work hardening behaviour for this welded joint remains practically unaffected compared to base metal AISI 316, describing by the presence of two work hardening stages. A higher work hardening exponent (n) is recorded for the similar welded joints at a friction time 6.5 s. However, a higher (n) value is recorded for the dissimilar welded joint at a friction time of 10 s.

Keywords:*Austenitic stainless steel; Direct friction welding; Behaviour laws; Tensile properties; Work hardening behaviour; Microstruture..*

Corresponding author's:bouchareb.hicham.usthb@gmail.com
sciencesconf.org:ncmm2023: T01-2023028

EFFECT OF TEMPERATURE ON THE ELABORATION OF NICKEL COATINGS ON COPPER

Amira GHARBI 1 , Youcef HAMLAOUI 2

1 Laboratory of Physics of Matter and Radiation (LPMR), Faculty of Science and Technology, University Mohamed Cherif Messaadia, BP 1553- 41000, Souk Ahras, Algeria 2 Laboratory of Physics of Matter and Radiation (LPMR), Faculty of Science and Technology,

Abstract

Due to its wide use in several applications and requirements as in electrical connector contact and thermal nuclear energy fields, copper has been extensively investigated. However, it's considered as an active metal susceptible to corrosion in humid conditions. The present research aims to to investigate the behavior of copper in watts bath and then after to the electrodeposition of nickel layers on copper substrates by cyclic voltammetry from watts bath at a scan rate of 20 mV/s and at different bath temperatures between 25 and 55 °C . The electrochemical behavior and corrosion properties were evaluated by cyclic voltammetry, potentiodynamic and electrochemical impedance spectroscopy (EIS) . While the surface analysis of nickel coatings at different temperatures was conducted by optical microscopy and white light interferometer (WLI). The obtained results show that the Ni layers have been deposited successfully on the Cu substrates. It was found that raising the bath temperature leads to smoother, dense, compact and recovering Ni coatings with a decrease in the grain size and average roughness and an increase in the deposits thickness .While the polarization resistance of copper in watts bath decreases by increasing the temperature of the bath to reach 315.2 Ω/cm2 at 55°C.

Keywords:*Ni coatings , Cyclic voltammetry , Copper corrosion , WLI , Temperature ..*

Corresponding author's:amira.gharbi@univ-soukahras.dz
sciencesconf.org:ncmm2023: T01-2023030

STUDY OF THE SOLID-LIQUID INTERFACE USING THE SPECS METHOD

Yasmine BELAZOUGUI^1, Abdelhafid DIB^1, Radouane MAIZIA^1, Disa BOUBAKEUR^1, Anthony THOMAS², Sergeui MARTEMIANOV²

1 Département de génie des procédés, Laboratoire d'électrochimie corrosion et valorisation énergétique, (LEVVE), Université A. Mira de Bejaia, Algérie ; 2 Institut Pprime, Université de Poitiers-CNRS-ENSMA, UPR 3346, 11 Boulevard Marie et Pierre Curie, BP

Abstract

Electrical double layer capacitors (EDLCs), also known as supercapacitors, are devices that store electrical energy by creating a double layer at the interface between the charged electrode and the electrolyte. More specifically, when an electronic conductor comes into contact with an ionic conductor, a charge distribution occurs at this interface, a phenomenon known as electrical double layer (EDL). Various electrochemical methods have been developed to analyze the contribution of different charge storage mechanisms, such as the electrical double layer and diffusion-limited processes at the solid/liquid interface.in this study, the interface consists of glassy carbon immersed in an electrolyte solution of H2SO4. Here, we present the application of the stepped potential electrochemical spectroscopy (SPECS) technique to elucidate the various charge storage mechanisms, including capacitive and diffusional processes. This research demonstrates the effectiveness of the SPECS technique in characterizing the electrochemical performance of the solid/liquid interface, providing valuable information.

Keywords:*Electrical double layer, Charge storage, Step potential electrochemical spectroscopy, specific capacitance.*

Corresponding author's:belazougui01yasmine@gmail.com
sciencesconf.org:ncmm2023: T01-2023032

MODELING THE PROPERTIES OF ZERO-DIMENSIONAL ARSENIC NANOMATERIALS DOPED WITH ONE TRANSITION METAL ATOM

Chaouki SIOUANI1,2, Sofiane SAFER2, Sofiane MAHTOUT2

1Department of Material Sciences, Faculty of Sciences, University of Algiers 1, Algeria.
2Theoretical Physics Laboratory, Faculty of Exact Sciences, University of Bejaia, Algeria.

Abstract

We report herein the ab-initio modeling on the structural, electronic and magnetic properties of Pd-doped arsenic nanomaterials (PdAsn (n = 0-20)). A detailed study on the atomic composition dependent physical properties of these PdAsn clusters has been performed employing spin polarized density functional theory (DFT) with the generalized gradient (GGA) approximation implemented in the SIESTA code. Structures, stabilities, electronic and magnetic properties are presented and discussed. Our theoretical investigation reveals that the transition metal atom Pd enhance the stability of pure arsenic clusters. The optimized clusters reveal that the most stable structures and their corresponding isomers have three dimensional configurations. The lowest energy structure of PdAsn generally differs from that of pure arsenic clusters. The relative stabilities have been studied in terms of the binding energies, fragmentation energies and second-order difference of energies for all PdAsn nanostructures. The binding energy per atom of doped arsenic clusters increases with the size n. The fragmentation energies show an oscillating behavior for all structures. The values of HOMO-LUMO gaps have a decreasing tendency along with the increasing number of As atoms in the cluster. The HOMO–LUMO gaps decrease considerably in our studied clusters which suggest an increase of metallic property. The total magnetic moment depends on the geometry, the position of Pd atom in the cluster, the charge transfer and orbital hybridization. The vertical ionization potential (VIP), vertical electronic affinity (VEA), chemical hardness (η), adiabatic electronic affinity (AEA) and adiabatic ionization potential (AIP) have also been investigated and discussed.

Keywords:*Ab-initio modeling, DFT, SIESTA, physical properties, arsenic nanomaterials.*

Corresponding author's:siouanichaouki@gmail.com
sciencesconf.org:ncmm2023: T01-2023033

FADDEEV-JACKIW QUANTIZATION AND ITS APPLICATION TO MAXWELL FIELD.

Warda BENARAB 1 , Zahir BELHADI 2

1Laboratoire de physique théorique/Faculté des sciences exactest, Université de Bejaia. 06000 Bejaia, Algérie. 2Laboratoire de physique théorique/Faculté des sciences exactest, Université de Bejaia. 06000 Bejaia, Algérie.

Abstract

According to the postulates of quantum mechanics, one can describe the temporal evolution of a system in terms of operators expressed using Poisson brackets for regular systems and Dirac brackets for singular systems with constraints. The exploration of constraints has emerged as a foundational objective in the field of quantification research. Faddeev and Jackiw have presented a direct approach for quantifying systems characterized by constraints. This method obviates the requirement for constraint prioritization, as all constraints are uniformly evaluated against the same standard. The Faddeev-Jackiw quantization quantization method is employed to study the Maxwell field. We show that the zero modes of the symplectic matrix are the generators of the gauge transformation. After fixing the gauge, the generalized brackets are calculated.

Keywords:*Singular systems, constraints, Dirac brackets, Faddeev-Jackiw formalism, Maxwell vectorial field..*

Corresponding author's:benarabwardaphythe@gmail.com
sciencesconf.org:ncmm2023: T01-2023034

ELECTRONIC STRUCTURE OF (INN)N/(GAN)N(001) SUPERLATTICES

Hafida Belghoul1, Oukli Mimouna1

1Applied Materials Laboratory (A.M.L), Faculté de Genie Electrique, University DjillaliLiabes of Sidi Bel Abbes, 2200 Sidi Bel Abbes Algeria

Abstract

This paper reports first-principles investigations of structural and electronic properties of standard InN/GaNsuperlattices oriented following the (001) axeswithdifferent numbers of InN andGaN monolayersusing the full potential linear muffin-tin orbitals method (FPLMTO) within density functional theory. . The effect of periodicity layer numbers n on the band gaps and the optical activity of InN, GaN and their (InN)n/(GaN)n superlattices (SLs) are investigated and compared.Because ofprospective optical aspects of (InN)/(GaN) n such as light-emitting applications, this theoretical studycan help the experimental measurements.

Keywords:*InN, GaN, Growth axis, Superlattices, Electronic structure, Optical properties..*

Corresponding author's:hafidabelghoul@gmail.com
sciencesconf.org:ncmm2023: T01-2023036

THE EFFECT OF HYBRID NANO-FLUID □AL□_2 O_3-CNT/WATER IN A HEAT EXCHANGER RECTANGULAR-SHAPED TUBE

Maissa Bouselsal1, Fateh Mebarek – Oudina 2

1Departement of Physics, Faculty of Sciences University of 20 Aout 1955-Skikda- Algeria
2Departement of Physics, Faculty of Sciences University of 20 Aout 1955-Skikda- Algeria

Abstract

Heat transfer plays an important role in industrial and thermal systems, it manifests itself in various forms radiation, conduction and convection, the latter is the most targeted in certain specific areas such as the cooling of processors, electronic components, radiators and heat exchangers. In this work a numerical study of a turbulent flow in free convection in a heat exchanger the Rectangular-shaped tube filled with a coolant; either a mixture of a base fluid (water) and Alumina and/or CNT nanoparticles, for a Reynolds number ranging from 2350 to 2700, and a density fraction of nanoparticles ($0.01<\varphi<0.04$). The finite element method is used to model the problem. The results are presented as isotherms, Streamlines, and medium Nusselt profiles. The presence of nanoparticles in the heat transfer fluid improves heat exchanger thermal performance.

Keywords:*Nanoparticles; exchanger; density fraction; heat transfer..*

Corresponding author's:maissabou8@gmail.com
sciencesconf.org:ncmm2023: T01-2023037

TRIBOLOGICAL AND MORPHOLOGICAL PROPERTIES OF FILMS DEPOSIT ON METALLIC PROSTHESES

Romayssa DERGHOUM1 , Latifa KAHLOUL1 ,Soumaya MEDDAH2

1 mininig, metallurgy and materials laboratory National Higher School of Technology and Engineering, Annaba, Algeria .22. Research center in industrial technology CRTI-Annaba, Algeria

Abstract

Stainless steel, titanium and CoCrMo alloys are the most widely used biomaterials for orthopedic applications. The most common causes of failure of orthopedic implants after implantation are infection, poor corrosion resistance, low mechanical strength, dissolution of toxic elements and excessive wear. To solve the problems associated with implant materials, various design, material and surface modifications have been developed. Among the different methods, the coating is an effective method to improve the performance of implant materials. This work aims to synthesize hydroxyapatite coatings on metal prostheses to improve biocompatibility and increase the corrosion resistance, wear and find better osseointegration. The hydroxyapatite coating will be prepared by the sol-gel technique technique that has an excellent potential for deposition the biocompatible HAp and has many advantages over other methods and we will study the effect of the temperature, PH and Ca/P molar ratio on the tribological and morphological properties of hydroxyapatite. The results obtained indicate that hydroxyapatite synthesized by sol-gel technique is more advantageous and that this coating improves the resistance to corrosion and wear, also, indicate that had a low friction coefficient and the surface morphology of HAp observed by SEM shows that the deposit has an uniform and homogenous appearance . The results also showed that the realized coating has good properties and could be a potential and promising implant for orthopaedic surgery.

Keywords:*Hydroxyapatite, Tribological, Sol-gel ; Morphological.*

Corresponding author's:r.derghoum@ensti-annaba.dz
sciencesconf.org:ncmm2023: T01-2023038

PERFORMANCE EVALUATION OF TUBE / SHELL HEAT EXCHANGERS USING ZNO-MWCNT/WATER HYBRID NANO FLUID

Maissa Bouselsal1, Fateh Mebarek – Oudina 2

1 Département de physique, Faculté des sciences, Université 20 Aout 1955-Skikda, Algérie. 2 Département de physique, Faculté des sciences, Université 20 Aout 1955-Skikda, Algérie.

Abstract

tube / shell heat exchangers have become popular recently in many practical applications one of them is the metallurgical industry. For example, heat exchangers can be used as a system to cool or warm fluids at different stages and keep baths at temperature, and also used for cooling pressed micro-chips in smaller and smaller spaces, with very little space to evacuate heat. Therefore, improving their heat transfer characteristics is a key issue for the development of small-scale integrated systems. In this work a numerical study of a turbulent flow in a shell/tube heat exchanger filled with a coolant; either a mixture of a base fluid (water) and ZnO and/or MWCNT nanoparticles, for a Reynolds number ranging from 2300 to 2700, and a volume fraction of nanoparticles ($0.02<\varphi<0.08$). The finite element method is used to model the problem. The results are presented as isotherms, isocontours, and middle Nusselt profiles. The presence of nanoparticles in the heat transfer fluid improves the heat performance of the exchangers.

Keywords:*Nanoparticles; exchanger; volume fraction; heat transfer*

.

Corresponding author's:maissabouslsl@gmail.com
sciencesconf.org:ncmm2023: T01-2023039

DFT CALCULATIONS OF CUBIC PEROVSKITE BASNO3 FOR OPTOELECTRONIC APPLICATIONS

Sawsen BELBAHI1*, Malika LABIDI1,2, Salima LABIDI1 and Rachid MASROUR3

1 LNCTS Laboratory, Department of Physics, Faculty of Sciences, BadjiMokhtar University, Annaba, Algeria. 2National Higher School of Technology and Engineering-Annaba, Algeria 3Laboratory of Solid Physics, Faculty of Sciences, Sidi Mohamed Ben Abde

Abstract

Electronic, structural properties of the cubic perovskite BaSnO3 have been calculated using the full potential linearized augmented plane wave (FP-LAPW) based on density functional theory (DFT) implemented in the Wien2k code. The exchange-correlation potential was treated using approximation GGA-08 to calculate the structural properties. The modified Becke and Johnson potential approximation (mBj-GGA) is also used to improve the estimate of the energy band gap for BaSnO3 compound. For structural parameters, there is excellent agreement between the computed findings and the experimental data for the predicted lattice parameter (a = 4.1284 Å), bulk modulus (B = 151.7 GPa), and its pressure derivative (Bp = 4.914). In addition the band structure and electrical density of states (DOS) in the ground state are calculated extensive.

Keywords:*BaSnO3; perovskites; DFT; Band structure; DOS; properties.*

.

Corresponding author's:sawsenbelbahi@gmail.com
sciencesconf.org:ncmm2023: T01-2023165

Contribution à l'étude des propriétés physiques et mécaniques du bois de chêne zeen en Algérie effet station

Roza AKKAL1, Hamid AKNOUCHE2, Fazia KROUCHI 2,Arezki DERRIDJ2

[1] unité de recherche matériaux procédés et environnement UMBB [2]laboratoire de production amélioration et protection des végétaux et des denrée alimentaires UMMTO

Abstract

The Zean oak (Quercus canariensis Willd), represents an important forest resource in Algeria where it occupies vast forest massifs and plays an ecological and socio-economic role and its wood could be valued on the industrial level. It is an essence that was used, during the colonial period, for the manufacture of railway ties and was, during the post-independence period, locally used in the Akfadou (Adekar), in cabinetmaking and carpentry, by a craftsman who was able to highlight the qualities of his wood. In the context of sustainable forest management, it is possible to take wood for industrial uses, which requires prior knowledge of the technological properties of wood for optimal recovery.Our work contributes to a better understanding of the physical, mechanical and chemical properties of wood of this species.Zeen oak wood was harvested in two stations of the Akfadou (Mehaga, Iguerssefen) and one station of Jijel.The physical and mechanical tests were carried out on standardized specimens and concerned the determination of humidity; axial (RA), radial (RR) and tangential (RT) retreats; total volumetric shrinkage (RVT); volumetric shrinkage coefficient (CRVT) ; four-point bending strength; shear strength and axial compression. The results of the study show the influence of the station on the properties of wood. They also show that the species under consideration has interesting mechanical characteristics, which opens up prospects for its use in wooden structures (house, shed, etc.).

Keywords:*Quercus canariensis Willd, mechanical test, physical test, wood, recovery.*

Corresponding author's:akkal.rosa@gmail.com
sciencesconf.org:ncmm2023: T01-2023171

INFLUENCE OF THE MATERIAL DISTRIBUTION LAWS OF THE VOIGT AND MORI-TANAKA MODEL ON THE FREE VIBRATION OF A THICK BEAM

Kenza DJILALI DJEBBOUR1, Mokhtar NEBAB 2, Hassen AIT ATMANE3,Riadh BENNAI 4

1 Faculty of Civil Engineering and Architecture, University of Chlef. 2Faculty of Technology, University of Boumerdès.

Abstract

This work presents a first-order shear deformation theory (FSDT) for the analysis of free vibrations of functionally graded beams. The number of unknowns and governing equations of the current theory is reduced, making it simple to use. Unlike other theories, the number of unknowns involved in the displacement field is only four, as opposed to five or more in the case of other shear deformation theories. Distributions of ceramic and metal materials across is the height of the beam according to two models of Voigt and Mori-tanaka.This beam theory approach accounts for both transverse shear deformations and satisfies zero-tension conditions on beam surfaces with the use of a shear correction factor. Hamilton's principle is used here to derive the equations of motion.The influence of the laws of the Voigt model and the Mori-Tanaka model, as well as their effects on the free vibrations of an FGM beam, has been successfully studied. The correctness of the proposed solution is verified by comparing it with other closed-form solutions available in the literature.

Keywords:*FREE VIBRATION, VOIGT'S LAWS, MORI-TANKA, FSDT, FUNCTIONAL GRADIENT BEAMS..*

Corresponding author's:djilalidjebbourkenza@gamil.com
sciencesconf.org:ncmm2023: T01-2023180

GSTC-FDTD SIMULATION OF LORENTZIAN DISPERSIVE METASURFACES

Lylia DJEMAIAI, Abdelaziz MEZEGHRANE, Abderrahmane BELKHIR, Fadi Issam BAIDA

Laboratoir de physique et chimie quantique, Université Mouloud Mammeri, 15000, Tizi-Ouzou, Algerie. Institut FEMTO-ST Institute, UMR 6174 CNRS, Department of Optics P. M. Duffieux, University Bourgogne Franche-Comté, 25030 Besançon Cedex, France.

Abstract

Metasurfaces are sub-wavelength thick electromagnetic structures that can be used to control the scattering of electromagnetic waves. Due to their low thickness, they can be considered as the two-dimensional counterparts of volumetric metamaterials. However, compared to metamaterials, metasurfaces offer the advantages of being less bulky, less lossy and easier to fabricate in both the microwave and optical regime. Metasurfaces can be modelled by zero-thickness films (equivalent boundary conditions), which can simultaneously exhibit electrical and magnetic discontinuities. The Generalised Sheet Transition Conditions (GSTC) technique is the only known approach to rigorously model metasurfaces in the general case. It describes the metasurface in terms of susceptibility tensors in the spatial domain. This susceptibility tensor based algorithm has recently been adapted to the Yee scheme on which the FDTD method is based. In this work, an efficient auxiliary differential equation (ADE) method is proposed to implement dispersive metasurface, described by a Lorentz model, in the FDTD algorithm.

Keywords:*GSTC-FDTD, ADE method, Dispersive metasurface, deflectors, surfasic susceptibilities..*

Corresponding author's:lylia.djemaiai@ummto.dz
sciencesconf.org:ncmm2023: T01-2023184

Characterization of galactoglucomannans from Pinus halepensis for biopolymer applications

Nacera Benouadah

Research Unit, Materials, Processes and Environment (UR-MPE), M'Hamed Bougara University, 35000 Boumerdes, Algeria

Abstract

The effectiveness of extraction in optimal conditions of galactoglucomannans (GGMs) from Pinus halepensis with pressurized hot water extraction was investigated for applications like coatings and films in packaging. For this purpose, optimal molecular masses with high yields are required, presenting a serious challenge for hot water extraction processes. The extraction of GGMs was carried out in an accelerated solvent extractor (ASE) and the isolation was performed by precipitation in ethanol. Three temperatures in the range 160-180°C and five extraction times 5-90 min were tested in order to optimize extraction parameters of GGMs, avoiding thermal and chemical degradation in hot water. Total dissolved solids (TDS) were determined gravimetrically after freeze-drying and weight average molar masses (Mw) were determined by High Performance Size Exclusion Chromatography (HPSEC). Total non-cellulosic carbohydrates were determined by gas chromatography (GC) after acid methanolysis. Free monomers were additionally analyzed by GC. Lignin in water extracts was measured by a UV method. Acetic acid was determined after alkaline hydrolysis of acetyl groups and analyzed by HPSEC. The main parameters influencing the extraction processes of the GGMs, namely, extraction time and temperature were studied. Optimal extraction parameters of GGMs were identified at 170 °C and 20 min extraction time, with average Mw of extracted fraction of 7 kDa leading to a GGM yield of approximately 56 □mg g□_(o.d.m)^(-1), corresponding to 6% on dry wood basis.

Keywords:*Coatings; films packaging; GGMs; hot water; Pinus halepensis..*

Corresponding author's:benouadahnacera@univ-boumerdes.dz
sciencesconf.org:ncmm2023: T01-2023187

INVESTIGATE THE STRUCTURAL, ELECTRONIC, AND MAGNETIC PROPERTIES OF THE QUATERNARY HEUSLER ALLOY COMNVSI

AMRAOUİ Rabie, KADRI Salim, TOURAB Mohamed

Material Physics Laboratory — L2PM, 8 May 1945 University of Guelma, Algeria

Abstract

This study investigates the structural, mechanical stability, electronic, magnetic, and thermal properties of the quaternary Heusler alloy CoMnVSi, by using the full-potential linearized augmented plane wave (FP-LAPW) method, as a part of the Density Functional Theory (DFT) as implemented in wien2k software. The potential for exchange and correlation is described by the generalized gradient approximation as proposed by Wu and Cohen (WC-GGA) to calculate the structural and mechanical properties, whereas the Becke and Johnson modified by Tran–Blaha (TB-mBJ) approximation is applied for the electronic and magnetic properties. The total energy calculated as a function of the volume shows that the Type-II ferromagnetic (FM) structure is the most stable for this material. The elastic constants and their associated elastic moduli, as well as the thermal properties, were calculated. The results indicate that the alloy is mechanically stable with extremely high mechanical anisotropy and interatomic central forces in all types of structures. Additionally, CoMnVSi alloy in its Type-II phase exhibits a half-metallic behavior with the total magnetic moment equal 1:B, there by satisfying the Slate-Pauling rule. These results classify CoMnVSi as a new half-metallic Ferromagnets (HM-FM) material with a 100% spin polarization which is suitable for spintronic applications.

Keywords://.

Corresponding author's:amraoui.rabie@yahoo.com
sciencesconf.org:ncmm2023: T01-2023240

ETUDE THÉORIQUE DES PROPRIÉTÉS STRUCTURALES, MÉCANIQUES, THERMIQUES ET TRANSPORTS DES ALLIAGES HALF- HEUSLER, POUR UNE SIMULATION PAR MEF D'UN ACTIONNEUR ÉLECTROTHERMIQUE MEMS

Kadri Salim, Tourab Mohamed, Amraoui Rabie, Bouaricha Amor

doctoral student

Abstract

The aim of this work is to select a new compound similar to polysilicon and conduct a numerical simulation to predict the performance of an electrothermal actuator using the new material before manufacturing. The carefully chosen new compound belongs to the well-known family of Half-Heusler compounds in the field of materials physics and semiconductors. This family possesses mechanical, thermal, and thermoelectric properties that are adaptable to the fields of electrical and microelectronic applications. Until now, it has been the focus of researchers who have sought to understand its properties through either synthesis or ab-initio simulations. In this study, we selected the Half-Heusler compounds and performed an ab-initio investigation within the framework of Density Functional Theory (DFT) to determine their elastic properties. We employed the FP-LAPW (Full-Potential Linearized Augmented Plane Waves) method using the Wien2k code to solve the Density Functional Theory (DFT). In this study, we utilized the GGA-WC (Generalized Gradient Approximation with WC functional) approximation for our calculations. Leveraging the computational capabilities of the Gibbs and Boltztrap codes, we solved the quasi-harmonic Debye equation and the Boltzmann equation to calculate several thermal and transport properties. These properties will subsequently be utilized in a multiphysics simulation model using Ansys to predict and observe the behavior of an actuator with the physical properties of this new compound

Keywords://.

Corresponding author's:s.kadri@univ-boumerdes.dz
sciencesconf.org:ncmm2023: T01-2023256

STRUCTURAL, ELECTRONIC, MAGNETIC AND MECHANIC PROPERTIES OF THE FULL-HEUSLER ALLOY CO2MNGA

RABIE amraoui

Laboratoire de Physique des Matériaux, Université 8 mai 1945, Guelma, Algeria

Abstract

In this work, we will study the structural, electronic, magnetic and mechanical properties of the full-Heusler Co2MnGa alloy with functional density theory (DFT). The structural, electronic and magnetic calculations will be performed using the maximum potential linear augmented plane wave (FP-LAPW) using the WIEN2K code where we used the generalized gradient approximation (GGA-WC). The stiffness constant of the spin wave (D) and the Curie temperature (Tc) arec alculated also the mechanical parameters, including the three elastic constants, the compression modulus, the Young's modulus and the shear modulus. This theoretical study provides detailed information on the compound Co2MnGa full-Heusler, in different aspects and can also provide information on the application of this material.

Keywords://.

Corresponding author's:amraouirabie9@gmail.com
sciencesconf.org:ncmm2023: T01-2023267

MODELING THE RESPONSE OF FIBER-REINFORCED CONCRETE BEAMS – EFFECT OF TIRE-RECLAIMED FIBERS

AghilesNekmouche and MohandOuldOuali
Université de Tizi-Ouzou

Abstract

This work is dedicated to the study of the structural response of concrete and fiber concrete beams. We will be particularly interested in the failure modes of these beams under quasi-static stress. To do this, a numerical model is built using the Abaqus finite element commercial code. This model was validated in comparison with the available experimental results and after calibration of the parameters of the Concrete Damaged Plasticity (CDP) model. The constitutive material of these beams is assumed to contain two kinds of steel fibers added to the concrete: Industrial Steel Fibers (ISF) and Tire-Reclaimed Fibers (TRF). The capacitance curves predicted by the CDP model for the three percentage of TRF used demonstrate how fibers improves both strengths and ductility of the beams. With the added benefit of protecting the environment and reducing steel waste, TRF exhibits behavior that is comparable to or better than using industrial fibers for the same percentage of fibers.

Keywords://.

Corresponding author's:nad_talbi@yahoo.fr
sciencesconf.org:ncmm2023: T01-2023273

MULTI-OBJECTIVE OPTIMISATION OF TURNING PROCESS PARAMETERS USING MAIRCA METHOD

Sabrina HAOUES1, Mohamed Athmane YALLESE1, Septi BOUCHERIT1, Mounia KADDECHE1 and Salah HADJELA1.

1 Mechanics and Structures Research Laboratory (LMS), May 8th 1945 University, P.O. Box 401, Guelma 24000, Algeria

Abstract

Manufacturers nowadays attempt to cut machining costs by lowering energy usage, boosting productivity, and ensuring product quality. In order to identify the cutting conditions and provide improved performance characteristics, this work presents a multi-objective optimization analysis of the turning process. The experimental trials were conducted in accordance with Taguchi's orthogonal array (L9) methodology, using dry machining techniques for the turning process of a 30% glass fibre-reinforced polyamide (PA66-GF30) material. A metal carbide cutting tool was used for the machining operations. Cutting speed (Vc), feed rate (f), and depth of cut (ap) are the three input parameters. Also, the desired performance parameters are surface roughness (Ra), cutting power (Pc), cutting force (Fz), and material removal rate (MRR). The MAIRCA (multi-attributive ideal-real comparative analysis) method is applied to solve multi-objective problems. The aim is to find the significance of the cutting conditions on the performance parameters and also to obtain an optimal combination of the machining parameters by the multi-attributive ideal-real comparative analysis optimization method. The objective of this study is to minimize the performance parameters such as surface roughness (Ra), cutting power (Pc), and cutting force (Fz) and maximize the material removal rate (MRR).

Keywords:*Manufacturers, PA66-GF30%, Optimization and MAIRCA method..*

Corresponding author's:haouessabrina40@gmail.com
sciencesconf.org:ncmm2023: T02-2023041

OPTIMIZING CUTTING PARAMETERS WHEN MACHINING AISI 4140

Salah Hadjela1, Salim Belhadi1, Mounia Kaddeche1, Med Athmane Yallese1, Younes Belbellaa[2].

1) Laboratoire de Mécanique et Structures (LMS). Université 8 mai 1945. Guelma. Algérie.
2) Laboratoire de Mécanique Appliquée des Nouveaux Matériaux (LMANM), Université 8 mai 1945 Guelma, Algeria

Abstract

The objective of modern manufacturing is to ensure quality while reducing production costs and increasing productivity. In this context, the selection of cutting materials is crucial due to their numerous applications. This presentation outlines an experimental study conducted during the machining of the alloyed steel AISI 4140, aiming to determine the optimal cutting parameters to achieve minimal surface roughness (Ra) as quality criteria, and maximum material removal rate (MRR) as productivity criteria. Two optimization approaches were employed: single-objective optimization using the Taguchi method to maximize MRR and minimize Ra, and multi-objective optimization using the TOPSIS (Technique for Order of Preference by Similarity to Ideal Solution) method to simultaneously optimize MRR and Ra. The Taguchi L16 experimental design was implemented to arrange 16 trials, taking into account cutting speed (Vc), feed rate (f), and depth of cut (ap) as input parameters, each set at four levels. The optimal combination obtained through the Taguchi was as follows: Vc=250 m/min, f=0.11 mm/rev, and ap=1.4 mm for Ra=0.616 µm, and Vc=333 m/min, f=0.22 mm/rev, and ap=1.4 mm for MRR=102,564 mm3/min. To achieve both minimal Ra and maximal MRR simultaneously, the optimal values of cutting parameters were as follows: Vc=310 m/min, f=0.14 mm/rev, and ap=1.4 mm, based on the results of multi-objective optimization for Ra=1.135 µm and MRR=60.760 m3/min. The Taguchi proved to be more effective for single-objective optimization, while the TOPSIS emerged as the best approach for multi-objective optimization.

Keywords:*Machining, AISI 4140, Taguchi, TOPSIS, Optimization.*

Corresponding author's:hadjlasalah@gmail.com
sciencesconf.org:ncmm2023: T02-2023042

CUTTING PERFORMANCE AND WEAR MORPHOLOGY OF TIN AND TIALN COATED CARBIDE AND UNCOATED CARBIDE TOOLS DURING DRY TURNING OF TI–6AL–4V

Khaoula ABBED1, Nabil KRIBES1, Smail BOUTABBA1

Applied Mechanics of New Materials Laboratory-LMANM, university´ 8 Mai 1945, P.O. Box 401, 24000 Guelma, Algeria

Abstract

Ti-6Al-4V is extensively used in machining because of its exceptional physical and mechanical characteristics. Nonetheless, machining this material is widely recognised as challenging because of its exceptional strength and toughness, limited heat conductivity, and chemical reactivity. To reduce overheating, tool wear, and workpiece damage, it is necessary to use specialised cutting tools, machining methods, and coolants. This research conducted a range of parametric experiments to assess the wear performance of TiN- and TiAlN-coated carbide tools, as well as uncoated carbide tools. The cutting speed (CS), feed rate (FR), and depth of cut (Doc) were consistent throughout these experiments. The findings are relevant to mechanical manufacturing firms and university researchers involved in Ti-6Al-4V manufacturing.

Keywords:*Ti-6Al-4V, TiN, TiAlN, Tool wear, Turning.*

Corresponding author's: Khaoulaabbed@gmail.com
sciencesconf.org:ncmm2023: T02-2023046

Improvement of the surface roughness of an aluminum alloy 2017 by the application of the ball burnishing process.

Mohamed TOURAB 1, Salim KADRI 2, Salah AGUIB 3

(1) Laboratory of Advanced Technology in Research Production Mechanical, Badji Mokhtar University, Annaba 23000, Algeria. (2), (3) Dynamic of Engines and Vibroacoustic Laboratory, F.S.I., M.B. Boumerdes University, 35000 Algeria.

Abstract

Ball burnishing is a cold working process with superficial plastic deformation that changes the basic properties of the surface layers of the material. In this work the process was applied on Aluminum 2017 by means of a device specially designed and manufactured for this purpose. It was used gradually as a finishing operation which gives additional advantages such as: the increase in surface hardness, resistance to fatigue, resistance to wear and to the generation of residual compressive stresses. The experimental results indicate that feed, burnishing force and speed are the most important and significant parameters to improve roughness surface. The number of passes is in addition to other parameters of burnishing has a significant effect on the turning surface. The turning surface roughness about 1.5 µm was decreased to 0.03 µm after burnishing with a rate of 98 %.

Keywords:*Aluminum 2017 – ball Burnishing - Surface roughness..*

Corresponding author's:mohtou2002@yahoo.fr
sciencesconf.org:ncmm2023: T02-2023047

MODELING OF TECHNOLOGICAL PARAMETERS IN A FINISHING TURNING OPERATION OF TI-6AL-4V TITANIUM ALLOY USING THE ANOVA ANALYSIS AND THE ARTIFICIAL NEURAL NETWORK METHOD (ANN)

Younes BELBELLAA, Nabil KRIBES, Mohamed Athmane YALLES

(1) Applied Mechanics and New Materials Laboratory (LAMANM), 8 May 1945 University of Guelma, Algeria. (2)Mechanical and Structural Laboratory (LMS), 8 May 1945 University of Guelma, Algeria.

Abstract

This work was dedicated to present the results of the modeling methodologies used. The response surface method (MSR) allowed us to develop models by multiple regression of surface roughness, cutting forces and vibrations. These responses were measured in finishing turning of the Ti-6Al-4V titanium alloy by two different types of tools, the experiments of which were carried out by varying the cutting speed (Vc), the depth of cut (ap) , feed (f) and tool type (coating). The effects of input parameters on studied responses were quantified using analysis of variance (ANOVA), and visualized through response surface plots. The artificial neural network is also adopted for modeling technological parameters.

Keywords:*Modeling, Ti-6Al-4V, ANOVA, ANN, Turning.*

Corresponding author's:younesbelbellaa@gmail.com
sciencesconf.org:ncmm2023: T02-2023168

STATIC ANALYSIS OF THE BEHAVIOR OF SMART SANDWICH BEAMS IN MAGNETORHEOLOGICAL ELASTOMER – HONEYCOMB

L. Guenfoud, N. Chikh, S. Aguib * , T. Djedid, L. Kobzili, A. Nour, M. Meloussi

M'Hamed Bougara Boumerdes University, Motor Dynamics and Vibroacoustics Laboratory

Abstract

The study's main objective is to understand the response mechanisms of magnetorheological elastomers (MREs) and explore their applications in vibration control and damping. Additionally, we seeks to assess the static behavior of new intelligent composite material structures in three-point bending tests, allowing for stiffness regulation, improved vibration attenuation, enhanced damping, and noise reduction. The methods employed include dynamic shear characterization of an elastomer with 30% micrometric iron particles under a magnetic field, numerical simulations using Abaqus software to analyze the static behavior of a sandwich beam honeycomb core with a magnetorheological elastomer layers, and the study of stress variations with deformations for each beam case. The results show that the addition of CIP particles enhances the shear modulus and improves stiffness and damping. The three-point bending tests on MREs beams demonstrate significant stiffness and damping, especially in the case of the honeycomb MREs beam. The developed specimens with a honeycomb core and an MREs layer offer substantial potential for improving damping capabilities. Notably, there is a considerable nonlinear increase in stress with deformation in the case of MREs honeycomb hybrid beams.

Keywords ***:****Structures hybrides, matériaux complexes, Analyse statique, magnetorheological elastomer..*

Corresponding author's:l.guenfoud@univ-boumerdes.dz
sciencesconf.org:ncmm2023: T02-2023175

VIBRATION BASED CONDITION MONITORING APPROACH USING THE NONLINEAR AUTOREGRESSIVE MODEL WITH EXOGENOUS INPUT AND THE DECISION TREE ALGORITHM.

Riadh Euldji1, Mouloud Boumahdi 2 ,Rafik EULDJI 3, Morad bachene 2

1 Applied Automation and Industrial Diagnostics Laboratory, Faculty of Sciences and Technology, University of Djelfa, 17000 DZ, Algeria, 2 Department of Mechanical Engineering, Faculty of Technology, University of Yahia Fares, Medea 26000, Algeria, 3 L

Abstract

Ball bearings are critical components in the rotating machines, in which their deterioration will produce other faults, such as misalignment, fatigue, and machine looseness, leading to complicated maintenance decisions making. This study aims to provide a methodology based on the Decision Tree (DT) algorithm and the nonlinear autoregressive model with exogenous input (NARX) model to monitor the degradation state evolution of the ball bearing. raw vibration data accrued from a real accelerated run to failure test rig are used. First time domain features are extracted from the vibration Condition Monitoring (CM) signal, second The Decision Tree algorithm is used to select the most important features that reflect on the degradation evolution of the critical components, and in the last step the selected features are feed into the Nonlinear Autoregressive Model with Exogenous Input (NARX), the overall of the obtained results indicate the effectiveness of the proposed approach for monitoring the ball bearing which helps for a proper maintenance decision making.

Keywords:*Decision Tree (DT), Condition Monitoring (CM), Nonlinear Autoregressive Model with Exogenous Input (NARX)*..

Corresponding author's:r.euldji@univ-djelfa.dz
sciencesconf.org:ncmm2023: T03-2023048

REMAINING USEFUL LIFE PREDICTION BASED ON THE SUPPORT VECTOR REGRESSION AND THE STEPWISE ALGORITHM.

Riadh EULDJI1, Mouloud BOUMAHDI 2 ,Rafik EULDJI 3, Morad BACHENE2

1 Applied Automation and Industrial Diagnostics Laboratory, Faculty of Sciences and Technology, University of Djelfa , Algeria, 2 Department of Mechanical Engineering, Faculty of Technology, University of Yahia Fares, Medea, Algeria. 3 Laboratory of Ad

Abstract

Machine breakdown through the years has grown in an extended way, leading to a huge loss and huge disasters. This paper aims to prevent from the machine failure by determining the Remaining Useful Life (RUL) of the ball bearings based on the Support Vector Regression (SVR) and the Stepwise algorithm. the Stepwise algorithm permits of selecting the most appropriate features extracted from the time domain vibration signal, to be fed into the SVR approach to model the nonlinear relation-ship of bearing behavior, the SVR model permit of obtaining the future values of the RUL which allows to determine the future state of the machine. Data gathered from the run to failure bearing operation PRONOSTIA dataset is used for training and testing the proposed model and its performance is evaluated in terms of the Root Mean Squared Error (RMSE), the Mean Absolute Error (MAE), and the Coefficient of Determination (R2). The overall of the proposed methodology shows high performance and effective RUL estimation.

Keywords:*Remaining Useful Life (RUL), Support Vector Regression (SVR), Condition Based Maintenance (CBM)..*

Corresponding author's:r.euldji@univ-djelfa.dz
sciencesconf.org:ncmm2023: T03-2023049

ANALYSIS AND INVESTIGATION OF THE VIBRATIONAL PATTERN OF MECHANICAL DEFECTS VIA A NEURAL MODEL

Nassereddine GUERTI 1,Tarek KHOUALDIA 2,Aymen CHIBOUTI 3

1-Department of Mechanical Engineering Laboratory of Research on Electromechanical and Dependability (LRESF), University of Souk Ahras Algeria" 2-Department of Mechanical Engineering Laboratory of Research on Electromechanical and Dependabili

Abstract

The present study proposes a methodology for developing a monitoring system that aims to detect various types of faults that may cause harm to rotating machinery. The proposed strategy for achieving the desired outcome involves the utilization of vibrational analysis methodologies, which are a set of techniques used to study the behavior and characteristics of vibrations. These methodologies are employed in conjunction with synthetic neural networks. The perceptron, which includes a single hidden layer in addition to the input and output layers, demonstrated rapid convergence when trained using the back-propagation algorithm with the error gradient associated with the lenvenberg-marquardt algorithm. The suggested approach uses vibrational analysis methods and synthetic neural networks. The convergence is quick, with only 14 iterations needed for learning. The training process was completed within a very short time frame, specifically a few hundredths of a second. The obtained results have major importance, as all three correlation coefficients surpass 98% and the mean square error is demonstrates negligible magnitude. Furthermore, this neural network has demonstrated a significant level of efficacy, on the other hand, the comparison of the values estimated by the model with those of the desired outputs allowed us to observe that out of the 3920 indicator values, 3763 were successfully detected and only 9 false detections, thus achieving a success rate surpassing a detection accuracy of 95% when presented with errors that differ from those used during the training process. The implementation of the proposed approach for online monitoring holds significant importance in the sector.

Keywords:*Fault diagnosis, Monitoring, Neural networks, Vibration analysis*.

Corresponding author's:n.guerti@univ-soukahras.dz
sciencesconf.org:ncmm2023: T03-2023052

ASSESSSMENT OF MAINTENANCE EFFICIENCY IN THE MODELS : AGE REDUCTION, REDUCTION OF INTENSITY AND HYBRID

Lamia MAY, Mohamed Arezki MELLAL, Youcef KHELFAOUI

Laboratoire de Mécanique, Matériaux et Energétique. Laboratoire de Mécanique, Matériaux et EnergétiqueLaboratoire de Mécanique du Solide et Systèmes.

Abstract

The evaluation of maintenance efficiency is crucial in decision-making and selecting maintenance strategies. Various modelling approaches have been developed by researchers to closely align with reality and evaluate the effects of maintenance actions. Throughout history, maintenance impact modelling has primarily focused on three approaches: virtual age models, where repairs decrease the system's age; intensity reduction models, where maintenance reduces failure intensity; and hybrid models that combine elements of both approaches. The present study explores the assessment of maintenance efficiency through various models to quantify the impact of maintenance operations and evaluate their effectiveness. The approach is implemented by analyzing a specific dataset.

Keywords:*maintenance efficiency, imperfect maintenance, age reduction, maximum likelihood.*

Corresponding author's:maylmaia2018@gmail.com
sciencesconf.org:ncmm2023: T03-2023156

MONITORING AND DIAGNOSIS OF ROTATING MACHINE FAULTS IN THE FREQUENCY DOMAIN

I.Gahlouz1, A. Chellil2, S.Lecheb2, H. Mechakra2
Faculty of Technologie, University of Boumerdes, Algeria.

Abstract

Vibration analysis is a method for detecting possible malfunctions and monitoring their evolution in order to plan or postpone a mechanical intervention. However, experience has shown that vibration is the most reliable parameter for early and optimal detection of the state of deterioration of a rotating machine. All machines produce vibrations and as the condition of the machine deteriorate: imbalance, bearing defects, gear defects, belt transmission problems, and the level of vibration increases.
This paper provides a vibration analysis of the main defects of rotating machines, with particular emphasis on the extraction pump, following a detailed procedure.

Keywords:*Dynamic,Vibration analyses, Unbalance fault, Misalignment..*

Corresponding author's:i.gahlouz@univ-boumerdes.dz
sciencesconf.org:ncmm2023: T03-2023182

APPLICATION OF SIGNAL PROCESSING FOR FAULT DIAGNOSIS OF MECHANICAL COMPONENTS SUBJECTED TO VIBRATION

Azeddine RATNI, Ali DAMOU, Djamel BENAZZOUZ

Solid Mechanics and Systems Laboratory, M'Hamed Bougara University of Boumerde.

Abstract

The monitoring and analysis of vibration signals from bearings allow for the early prediction of malfunctions and potential breakdowns. Due to its non-stationary nature, the vibration signal of bearings proves challenging to interpret with traditional analysis tools, which can lead to erroneous interpretations. We propose using envelope analysis (Hilbert Transform). By exploiting the signal from a transmission, we demonstrate the advantages of this method in diagnosing bearing systems. A three-degree-of-freedom dynamic model was considered, taking into account the translations of the bearing elements. To simulate the signal for analysis, we intentionally introduced flaking-type defects on the bearing components. To numerically solve the obtained system of differential equations, we opted for the MATLAB software.

Keywords:*Diagnosis, Signal processing, Bearing defects, defect modelling, Mechanical Defect*..

Corresponding author's:a.ratni@univ-boumerdes.dz
sciencesconf.org:ncmm2023: T04-2023053

Study of the parameters influencing the surface roughness of a steel material

Badr Eddine BOUDALI, Samir BOUTI , Khaled HAMOUDA
Materials science and engineering laboratory

Abstract

This paper investigates the influence of tribo-finishing processes on the surface condition of steel parts under different parameters. The vibratory abrasion process is a chemical-mechanical process, which involves the use of low frequency impact vibration in the presence of abrasive and chemical additives. It is a chemical-mechanical process which aims to remove the smallest metal particles and oxides on the surface to be treated. Thus, it causes a plastic deformation of the surface layer of the elements in contact. In this process of treatment, there are multiple micro impacts in different angles between the tool (media) and the parts to be treated. The improvement of the surface quality is determined by three parameters: the treatment time, the type of abrasive and the oscillation amplitude of the working chamber.

Keywords:*vibro-abrasion process, roughness, vibration..*

Corresponding author's: Boudali.badreddine1@gmail.com
sciencesconf.org:ncmm2023: T04-2023055

DYNAMIC BEHAVIOR AND VIBRATION CONTROL OF ROTATING MACHINERY WITH VARIABLE BEARING DAMPING

W. Ifrah1, A. Chellil1, B. Manser1, S. Lecheb1, A. Houari1, H. Mechakra1

1Laboratoire Mécanique des Solides et des Systèmes LMSS, Université M'hamed Bougara Boumerdes. 2Laboratoire dynamique des moteurs et vibroacoustiques LMDV, Université M'hamed Bougara Boumerdes. 3Laboratoire énergétique, mécanique et ingénierie LEMI, Unive

Abstract

The aim of this study is to investigate the critical speed analysis and response of rotating machinery with variable bearing damping, the use of the finite element method makes to establish dynamic equations of the movement. Numerical calculations of the model developed, can extract the natural frequencies and modal deformed vibration of the rotor, and this reduce is nonlinear. The Campbell diagram plot used to determine the critical speeds. Experimentally the study of the rotor in transient system allowed determining the vibratory responses due to the unbalances and various excitations.

Keywords:*stability, rotor, dynamic, critical speed.*

Corresponding author's:w.ifrah@univ-boumerdes.com
sciencesconf.org:ncmm2023: T04-2023155

NUMERICAL ANALYSIS TO EVALUATE THE CRACK ENERGIES BY THE FEM METHOD OF A CRACKED STRUCTURE OF A TWO-DIMENSIONAL MODEL IN THE ELASTOPLASTIC MATERIAL

Mohammed BENTAHAR

Technology Laboratory of Communication, Dr Tahar Moulay University, Saïda, Faculty of Technology, Department of Civil and Hydraulic Engineering.

Abstract

Fracture mechanics is a very broad field, as it deals with the study of crack propagation in materials. Moreover, in fracture mechanics, most components or structures generally contain defects of varying nature and magnitude. It uses methods of analytical solid mechanics and numerical simulation codes, to calculate and model the different crack characteristics of the different problems studied. This article deals with the evaluation of the crack parameters such as the different energies, deformation, internal, external and the total energy, of a cracked structure model containing a hole of diameter (Øh=0.1mm and Øh=0.4mm), by the finite element method and using the Abaqus computer code. The 8-node biquadratic plane stress quadrilateral elements (CPS4R) with the reduced integration were used. In addition, the validation of the results obtained in this work was compared between two hole modeling models, one of 0.1mm in diameter and the other of 0.4mm in diameter with the initial crack length a=1mm.

Keywords:*hole, energy, crack, FEM, Numerical modeling, 2D.*

Corresponding author's:bentahae@yahoo.fr
sciencesconf.org:ncmm2023: T05-2023056

FRETTING FATIGUE SIMULATION ON HOMOGENEOUS ISOTROPIC LINEAR ELASTIC MATERIALS BY THE FEM METHOD OF A 2D

BENTAHAR Mohammed

Technology Laboratory of Communication, Dr Tahar Moulay University, Saïda, Faculty of Technology, Department of Civil and Hydraulic Engineering.

Abstract

Fretting fatigue is a phenomenon that occurs when two contacting surfaces are subjected to oscillating tangential forces. In the modality the constraint is variable, contact fatigue can be defined as the accumulation of surface damage due to small plastic deformations that occur in a material, even below the elastic limit, generating microcracks that can lead to its rupture by micropitting. The objective of this work is to study the variation of the J-integral and the stress intensity factor (KI and KII) during the incerement of time of a cracked fretting fatigue model of the homogeneous isotropic linear elastic materials. These parameters were studied and evaluated by the two-dimensional finite element method using the Abaqus calculation code. The friction coefficient 0.5 was applied to the crack length (a). In addition, elements of type (CPE4R) and the maximum tangential stress criterion were applied.

Keywords:*SIF(KI, KII), Fretting fatigue, J-integral, Crack, 2D.*

Corresponding author's:bentahafmohamed@gmail.com
sciencesconf.org:ncmm2023: T05-2023057

MODELING THE EFFECT OF TRIAXIALITY AND LODE ANGLE ON THE RUPTURE OF STAINLESS STEEL USING A DISLOCATION DENSITY - BASED MODEL

Yanis Rassoul 1, Lahouari Benabou 2, Mohand Ould Ouali 2

[1]LEC2M, Mouloud MAMMERI University, BP 17RP, 15000 Tizi Ouzou, ALGERIA. [2]LISV, Université de Versailles Saint-Quentin dans les Yvelines, France.

Abstract

This work is dedicated to the study of the effect of the triaxiality and lode angle on the rupture of tubular structures. A micromechanical-based model incorporating several deformation mechanisms and formulated in the framework of the dislocation density theory is used to describe the viscoplastic behavior of a 316 stainless steel. The model has been implemented into the finite element code Abaqus using a Fortran coded subroutine VUMAT. After calibration of the model parameters with experimental available results, simulations of healthy and notched tubular specimens were carried out. In order to vary the triaxiality and Lode angle, we used specimens of different sizes and notch shapes. The results showed the capacity of the model to reproduce the experimental results of tubular structures. It was found that the strength of the material and its ductility of the specimens depended on the triaxiality and the Lode angle. The distribution of dislocation densities, according to the mechanisms considered in the model, also showed a dependence on these parameters.

Keywords:*Finite element simulations, Dislocation density approach, elasto-viscoplastic, Stress triaxiality, VUMAT subroutine*.

Corresponding author's:yanis.rassoul@ummto.dz
sciencesconf.org:ncmm2023: T05-2023058

EFFECT OF GEOMETRIC PARAMETERS ON STRESS CONCENTRATION IN PLATE WITH A HOLE SUBJECTED TO A TENSILE FORCE

Lina SAIFI 1, Ishak BERKANE 2 , Zohra LABED3

1,2,3Laboratory of Mechanics, Department of Mechanical Engineering, Faculty of Science and Technology, Frères Mentouri University Constantine 1, Chaab Erssas Campus, 25000 Constantine, Algeria

Abstract

The presence of holes in structures leads to weakening due to local stress concentration. When these holes cannot be avoided, it is crucial to determine the stress concentration factor associated with their geometry. In our study, we focused on the common case of tensile stress in a plate with a circular hole. This analysis was carried out for small perturbations, in an isotropic medium, with linear elastic behaviour. The aim of our study was to understand the impact of geometric parameters and loading on the stress concentration factor Kt resulting from the presence of a circular hole in a plate subjected to tensile loading. We used analytical and numerical methods to do this. In addition, we verified our results using the constitutive equations of Heywood and Howland, as well as a MATLAB program. To obtain more accurate data, we also used ANSYS software, a design tool, to extract stress concentration factors for various materials, including aluminium 2024. In summary, the aim of our study is to gain a better understanding of how holes in plates affect stress distribution, particularly in the case of tensile loading of a plate with a circular hole, and to provide useful data for analysing the safety and performance of structures subjected to this type of loading.

Keywords:*Stress concentration factor, Numerical methods , Hole plate , ANSYS , Heywood and Howland constitutive equations..*

Corresponding author's:lina.saifi@doc.umc.edu.dz
sciencesconf.org:ncmm2023: T05-2023060

NUMERICAL STUDY OF A CRACKED PLATE REPAIRED BY WELDING

Karim Mouas 1, Ishak BERKANE *2, and Zohra LABED 3

1,2,3 University of Mentouri Constantine brothers 1 Mechanics Laboratory, Department of Mechanical Engineering, Faculty of Technology

Abstract

This study examines the effectiveness of welded parts in reinforcing damaged components and preventing crack propagation. Using numerical simulations, the study evaluates the performance of soldered patches compared to components without patches. The results demonstrate that welded parts significantly reduce crack severity and improve overall structural integrity. Additionally, the results highlight the practical implications of using welded parts to improve the safety and durability of critical structures. A plate subjected to tension was simulated using the Ansys software, based on the stress intensity factor and the length of the crack. By reinforcing the cracked area, the weldment aims to prevent crack propagation and improve the overall structural integrity of the component

Keywords:*cracked plate 1 , Stress Intensity Factor 2 , repair 3 , welding 4 , numerical simulation 5.*

Corresponding author's:zohra_labed@yahoo.fr
sciencesconf.org:ncmm2023: T05-2023178

EFFECT OF THE AGING OF THE ADHESIVE ON THE BEHAVIOR OF REPAIRED CREAKED STRUCTURES IN PURE MODE I AND II

A. A. Houari , M. Belhouari, A. Benkheira , K. Madani and M. Elajrami

LMSS Department of Mechanical Engineering, Djillali Liabes University, Sidi Bel Abbes, BP 89 Cité Ben M'Hidi, Sidi Bel Abbes, 22000 Algeria

Abstract

Moisture absorption is a major parameter affecting the mechanical behavior of adhesives, since it causes plasticization of the polymer with a swelling effect if the immersion time is sufficiently long. The mechanical properties of the aged adhesive in distilled water at room temperature were experimentally measured to provide the data for finite element modeling. These properties were introduced into a numerical model consisting of a cracked aluminum 2024 T3 plate and repaired by a composite patch bonded with the Adekit A140 adhesive. The effects of the degradation of the mechanical properties of the adhesive and the crack length on the variation of the J integral and the size of the plastic zone at the crack tip were highlighted. The obtained results showed that moisture absorption has a negative effect on repair performance, since the fracture energy increases with increasing immersion time. The decrease in mechanical properties by water absorption leads to a decrease in repair performance.

Keywords:*J Integral; Plastic zone; Repair Composite patch; Mechanical properties; Aging effects..*

Corresponding author's:belhouari@yahoo.com
sciencesconf.org:ncmm2023: T05-2023188

PROBING CFRP FIBER ORIENTATION WITH EDDY CURRENTS: A NON-DESTRUCTIVE APPROACH

Oubbati FADIA1, Helifa BACHIR1, Bensaid SAMIR2, Naidjate MOHAMMED1, Lefkaier IBEN KHALDOUN1

1Laboratoire de physique des matériaux, Université de Laghouat, Laghouat,03000 Algérie, 2Laboratoire des matériaux et du développement durable, Université de Bouira, Bouira 10000, Algérie,

Abstract

Carbon Fiber Reinforced Polymers (CFRPs) have emerged as vital structural materials in various industries due to their exceptional strength-to-weight ratio. The fiber orientation in CFRPs significantly influences their mechanical properties, making it a critical aspect to assess for quality and performance. This paper presents an non-destructive investigation into the assessment of CFRP fiber orientation using Eddy Current Testing (ECT), it highlights the potential of Eddy Current Testing as a non-destructive means to assess and understand CFRP fiber orientation, offering valuable insights to improve the performance and structural integrity of CFRP components.Eddy Current Testing, a widely applied non-destructive testing technique, offers a unique avenue for assessing CFRP fiber orientation. This study explores the underlying principles and methodologies of ECT as applied to CFRPs, detailing the interaction between eddy currents and fiber orientation in these composites. By illustrating the effectiveness of ECT in quantifying fiber orientation in CFRPs, this research contributes to the understanding of how changes in fiber alignment can be detected through variations in eddy current responses.

Keywords:*Non Destructive Testing, Eddy Current, Carbon Fiber Reinforced Polymers, Fiber Orientations..*

Corresponding author's:f.oubbati@lagh-univ.dz
sciencesconf.org:ncmm2023: T06-2023062

NONDESTRUCTIVE CHARACTERIZATION OF FERROMAGNETIC STEELS BY MAGNETIC BARKHAUSEN NOISE TECHNIQUE

Hocine NEBAIR1,2, Sami ZIDELMEL3, Bachir HELIFA1, Samir BENSAID4, Ibn Khaldoun LEFKAIER1

1Laboratoire de Physique des Matériaux, Université de Laghouat, B.P. 37G 03000 Laghouat, Algeria 2Ecole Normale Supérieure de Laghouat, BP 4033, Laghouat, Algeria 3Laboratoire de Génie des Procèdes, Laghouat, Algeria 4Laboratoire des Matériaux et du Déve

Abstract

This work aims to characterize the metallurgical transitions during quenching of X70 steel by magnetic Barkhausen noise (MBN) non-destructive technique. In order to monitor the relationship between mechanical properties and micromagnetic parameters, a direct quench (DQ) treatment is used at the inter-critical annealing (IAT) temperature ranges applied to the samples from 740°C to 820°C. MBN were performed using the MikroMach instrument. Hardness measurements and microstructure examinations were carried out using a durometer and optical microscopy. The experimental results show that the DQ treatment revealed a hard martensite distributed in a ductile ferrite matrix. Martensite volume fraction (MVF) and hardness increase with increasing IAT. These treatments make it possible to obtain the highest hardness in DQ treatment at higher temperature. Indeed, the MBN method proved to be very sensitive to changes in microstructure and MVF morphologies.

Keywords:*Nondestructive characterization, metallurgical transitions, direct quenching treatment, magnetic Barkhausen noise*.

Corresponding author's:h.nebair@ens-lagh.dz
sciencesconf.org:ncmm2023: T06-2023063

USING A NON-DESTRUCTIVE TECHNIQUES FOR WOOD CHARACTERIZATION AND DEFECTS DETECTION

AHMIA Omar, DAOUI Abdelhakim

research unit :materials ,prrocesses and Environement (UR/MPE)

Abstract

Non-destructive methods (NDT) play an indispensable role in assessing the integrity and soundness of materials and structure in the industry field, furthermore it takes place in materials characterization, in this abstract, we emphasize on two methods, which are ultrasonic testing (UT) .Ultrasonics employ high-frequency sound waves to determine materials properties, detect defects, and measure thickness.The use of this techniques offers a comprehensive approach to structural assessment, and enabling the identification of defects at various materials including wood species.

Keywords:*Non-destructive testing, ultrasonic, characterization, defects detection, wood species.*

Corresponding author's:o.ahmia@univ-boumerdes.dz
sciencesconf.org:ncmm2023: T06-2023173

ARTIFICIALLY FROZEN SAWDUST-ICE MIXTURE (PYKRETE): A REVIEW OF ITS USABILITY IN CIVIL ENGINEERING APPLICATIONS

Mostefa HANI1,2, Ben Salah HADJI1, Tarek HADJI1, Burak EVIRGEN2

1Department of Civil Engineering, Ziane Achour University of Djelfa, Algeria. 2Department of Civil Engineering, Eskisehir Technical University, Eskisehir, Türkiye.

Abstract

Sawdust, the residue of furniture manufacturing, has been extensively utilized for environmental remediation. For this reason, using sawdust-ice mixtures can reduce the need for expensive materials. This study focuses on the usability of the artificially frozen sawdust-ice mixture (Pykrete) in the fields of civil engineering. Over the last decade, there has been a growing interest in composite materials. Insufficient studies have been conducted to investigate the mechanical properties associated with Pykrete utilization. This study provides a comprehensive overview of related publications that discuss the usability of Pykrete in structural and geotechnical engineering. It reviews the most common types of Pykrete systems, their basic configurations, and their main applications. Throughout the literature review, it is concluded that the subject of Pykrete material utilization has received a lot of attention in the last 20 years, especially in civil engineering applications. However, the number of experiments is very limited, and there is a vast opportunity for research and development in the usability of the Pykrete material to meet the needs of innovation structures, diaphragm walls, slope stability, and deep excavation via artificial ground freezing approaches. Consequentially, it is recommended to utilize sawdust as a component in combination with other substances across diverse domains.

Keywords:*Sawdust, Pykrete, Composite materials, Mechanical properties, Environmental and civil engineering, Geotechnical engineering..*

Corresponding author's:mostefa_hani@ogr.eskisehir.edu.tr
sciencesconf.org:ncmm2023: T07-2023065

COUPLED DAMAGE EFFECT IN THE STABILITY OF A COMPOSITE HELICOPTER ROTOR BLADE

S.Chellil 1, A.Nour1, A. Chellil 1,S. Lecheb 2, H.Mechakra 1, A.T. Settet 1

1LDMV Laboratory, M'hamedBougara University of Boumerdes, 35000 Boumerdes, ALGERIA

Abstract

In this paper, a coupled damage effect in the stability of a composite helicopter rotor blade is presented, under dynamic loading response in the stationary analysis condition. The analysis of the stress which operates the rotor blade is done. Calculations of different energies and the virtual work of the aerodynamic loads from the rotor blade are developed. The use of the composite material for the rotor blade offers a good result.Numerical calculations on the model developed prove that the damage effect has a negative effect on the stability of the blade.The study of the composite blade in transient system allowed determining the stress distribution due to various excitations.

Keywords:*composite blade, fatigue, damage,crack, vibtation..*

Corresponding author's:sadek.chellil@yahoo.fr
sciencesconf.org:ncmm2023: T07-2023066

DURABILITY OF A MORTAR CONTAINING SAND PLASTIC WASTE PVC TUBES

BENHALILOU Mohammed Ichem1 HEBHOUB Houria*2, BERDOUDI Said3

1, TCT, Batna 2 university, Batna, Algeria. 2, LMGHU, Department of civil engineering, Faculty of technology, Skikda university, Algeria 3, Department of Mining Engineering, Faculty of Earth Sciences, Laboratory LAVAMINE, Badji Mokhtar-Annaba Universit

Abstract

The main purpose of this study is to show technically the possibility of recuperating the plastic wastes obtained by sawing PVC tubes as a partial substitute in mortar. The plastic waste used in this study is a sand plastic wastes. To achieve this work, we have studied the effect sand wastes PVC substitution in ordinary sand in mortar with rates of 2%, 4% et 6%; comparing the results obtained with reference samples (0%) on the density, compressive and tensile strength at 90days and sustainability parameters, water absorption by immersion and capillary, porosity accessible to water and chemical attack by H2SO4. The results obtained show that the partial replacement of ordinary sand with plastic waste sand in the formulation of a mortar makes the latter lighter and absorbs less water by capillarity; however it negatively affects absorption by immersion and chemical resistance.

Keywords:*mortar, PVC wastes; valorization; sand; substitution; characterization; sustainability*

.

Corresponding author's:hebhoubhouria@yahoo.fr
sciencesconf.org:ncmm2023: T07-2023067

NUMERICAL STUDY OF THE ELECTRICAL CHARACTERISTICS OF A NEW ALGAN/GAN MOSHEMT DESIGN ON 4H-SIC SUBSTRATE WITH QUATERNARY ALINGAN SPACER LAYER

Amina NOUAL 1 , Zitouni MESSAI 2

(1)LIST Laboratory, University of M'Hamed Bougara, Boumerdes, Algeria (2) ETA Laboratory, University of Mohamed El Bachir El Ibrahimi, Bordj Bou Arreridj,

Abstract

Due to their ability to ensure high power and high frequency operations, AlGaN/GaN MOSHEMTs (Metal Oxide Semiconductor High Electron Mobility Transistors) attract a lot of attention for the upcoming generation of power switching circuits. Their outstanding performance is caused by the natural presence of high mobility of two-dimensional electron gas (2DEG) formed and accumulated at the AlGaN/GaN interface owing to a strong polarization-induced charge. In order to enhance the electron confinement of the conventional AlGaN/GaN device, a thin quaternary AlxInyGaN spacer layer is inserted between the barrier and the channel, with an aluminum content of 80%, an indium content of 18% and a thickness of only 2 nm.In this paper, a new heterostructure design of AlGaN/AlInGaN/GaN MOS-HEMT is investigated, with a 10 nm T-gate-shaped length and 5 nm TiO2 oxide layer grown on silicon carbide (4H-SiC) substrate. The analytical polarization model and sheet charge density of this structure are theoretically developed. In addition, the static analysis (DC) and the dynamic analysis (RF) of the proposed GaN MOS-HEMT are numerically investigated using an exhaustive two-dimensional (2D) simulation of the TCAD SILVACO Software at 300K. The developed device exhibits an excellent drain current (IDS,max) with a value of 1800 mA/m, a positive threshold voltage (Vth) of 2.47 V, and a maximum extrinsic transconductance (Gm,max) of 3000 mS. Therefore, the positive shift of Vth is due to the insertion of the TiO2 insulating layer, and the activated interface charge oxide/semiconductor by 1.85 × 1013 cm-2 donors. This negative charge are accumulated at the heterointerface Thus, the 2DEG is depleted and Vth shifts more positive value. On other hand, the experimental research demonstrate that Vth shifts towards positive value by using thin layer of AlInGaN spacer.

Keywords:*AlGaN/GaN1, InAlGaN spacer2, TiO2-based MOS-HEMT3, Maximum oscillation frequency4, SILVACO5..*

Corresponding author's:a.noual@univ-boumerdes.dz
sciencesconf.org:ncmm2023: T07-2023068

THE INFLUENCE OF SURFACE TREATMENT ON THE FIBER PHYSICAL AND THERMAL PROPERTIES

Mohamed Amine KACEM, Moussa GUEBAILIA

Laboratoire de Mecanique Appliquee et Systemes Energetiques

Abstract

Surface treatments of natural fibers are processes aimed at modifying the surface of fibers to improve their physical and chemical properties. Surface treatments can betwo main categories: physical treatments and chemical treatments. The surface treatment of natural fibers can have a significant influence on the physical and thermal properties of a biocomposite. Surface treatment can modify the surface structure of the fibers and improve adhesion between the fibers and the polymer matrix, which can have an impact on the physical and thermal properties of the bio composite. For example, treatment can improve the dimensional stability of the bio-composite, while improved adhesion between the fibers and the polymer matrix can reduce swelling and shrinkage of the material.Surface treatment can also affect the thermal conductivity of the bio-composite. For example, surface treatment can improve the dispersion of fibers in the polymer matrix, which can reduce the material's overall thermal conductivity.In this presentation, we will treat natural fibers using the best-known chemical method, using the chemical agent Naoh to eliminate all non-cellulosic elements in the fiber, and we'll look at thermal properties and the difference between treated and untreated fibers.

Keywords:*Thermal property; Chemical treatment; Characterization; Natural fiber; Bio composite..*

Corresponding author's: Kacem.mohamedamine@univ-ouargla.dz
sciencesconf.org:ncmm2023: T07-2023069

DETERMINATION OF CARBON FIBER-REINFORCED POLYMER COMPOSITES BY ULTRASONIC

Touil Zoulikha1 , Lefkaier Ibn Khaldoun2, Ahmed BENBELGHIT3, Bachir Helifa4

1 Materials Physics Laboratory, Amar Telidji University of Laghouat, BP 37G Laghouat, 03000, Alegria

Abstract

Composite materials are widely used in various industries due to their high strength-to-weight ratio and excellent mechanical properties. However, defects can occur during the manufacturing process or service life, which can compromise the structural integrity and performance of composite plates.Ultrasonic testing is a non-destructive testing method that utilizes high-frequency sound waves to detect and evaluate flaws, thickness variations, and material properties. When ultrasonic waves propagate through a material, they experience changes in velocity and attenuation based on the material, composition and internal structure. By analyzing the characteristics of the ultrasonic waves after they interact with the CFRP material, valuable information about its properties can be obtained.The principal objective of this work composite calculation consists in determining the characteristics mechanics of the material according.

Keywords:*COMPOSITE MATERIALS, MECHANICAL PROPERTIES, CFRP, NON-DESTRUCTIVE TESTING..*

Corresponding author's:z.touil@lagh-univ.dz
sciencesconf.org:ncmm2023: T07-2023071

THE OPTIMIZATION OF THE GEOMETRIC PARAMETERS OF COMPOSITE LAMINATE USING GENETIC ALGORITHM

H. Khouas 1, A,T. Settet 1 , A. Nour 1, S,Aguib 1,T.Djedid

1 Laboratoire Dynamique des Moteurs et Vibroacoustique , Université M'hamed Bougara boumerdes

Abstract

The use of composite material is widespread in the last decades thanks to their variousadvantages that they are providing compared to the traditional material, as it allow the
conception of the global properties of structure that corresponds better to the particular needof any situation and can be malleable to fit to any complex shape .As a further advantage, configuration of a laminate, i.e. fiber orientation, ply thickness,stacking sequence, reinforcement geometry can be tailored to reduce its weight withoutcompromising its performance, or improve the performance without increasing its weight.
These numerous advantages gives the engineers the freedom of tailoring the geometry andstructure along with mechanical properties that responds better to the precised problem Yet itgives a complex task for the engineer to find the correct number of layers and ply orientationangles that will provide a structure with the best performance given certain loading conditionsand boundary conditions as well failure constraints. In other hand, the structures made oflaminate cost a lot that is why is very important to take a wise decision. For this reason, inthis researches, the optimization using genetic algorithm as intelligent artificial technic is usedto select the best design among countless number of designs. among these variables those whoallows a better feasible structure modified to suit the needs of the problem at hand andcreating new combination in order to create new designs based the evaluation according toTsai-Wu criteria to finally obtain new optimized lamination configuration.The best panel obtained after 200 iteration had five layers where its thickness madeit have the aspect of a sandwich panel. As in perspective, a sandwich panel where it bottomand top skin will be made of laminated panels could be an interesting topic to explore.

Keywords:*design, Genetic Algorithm, composite laminate, optimization, Tsai-Wu.*

.

Corresponding author's:h.khouas@univ-boumerdes.dz
sciencesconf.org:ncmm2023: T07-2023073

FREE VIBRATION ANALYSIS OF LAMINATED COMPOSITE PLATES REINFORCED WITH CARBON FIBERS IN THERMAL ENVIRONMENTS

Zahira MOUAS 1, *, Rachid TIBERKAK 1, Mourad BACHENE 2, Madjid EZZRAIMI 1, Yasser CHIKER 2

1 Structure Laboratory, Mechanical Department, University of Blida 1, Blida, Algeria. 2 Laboratory of Mechanics, Physics, Mathematical Modeling (LMP2M), University of Medea, Medea, Algeria.

Abstract

The study aims to investigate the effect of temperature on the vibrational behavior of laminated composite plates. The analysis is carried out by the finite element method with the quadratic isoparametric element, which takes elevated temperatures into account. The first order shear deformation (FSDT) is used to derive the governing equations. Material properties of each lamina are assumed to be temperature dependent. A validation study is carried out to compare our findings against existing literature. Various numerical parameters, including temperature variation, length-to-width and aspect ratios, fiber orientation, and boundary conditions, are comprehensively investigated to understand their influence on the free vibration behavior of laminated composite plates. The results demonstrate a reduction in the natural frequency with an increase in temperature

Keywords:*Free vibration; temperature environment; Finite element method; Composite plates; Carbon fibers.*

Corresponding author's:zahiramouas@etu.univ-blida.dz
sciencesconf.org:ncmm2023: T07-2023074

ANALYSIS OF THE DYNAMIC BEHAVIOR OF MAGNETORHEOLOGICAL ELASTOMER COMPOSITE: ELABORATION AND IDENTIFICATION OF RHEOLOGICAL PROPERTIES

Nedjar Ali1, Aguib Salah1, Chikh Noureddine1, Kobzili Lallia1, Tourab Mohamed1, Khebli Abdelmalek2, Nour Abdelkader1, Settet Ahmed1, Djedid Toufik1

1Dynamic Motors and Vibroacoustic Laboratory, Faculty of Technology, University of Boumerdes35000, Algeria. 2Laboratoire Electrification des Entreprises Industrielles, Université de Boumerdès Algérie.

Abstract

The present work is devoted to experimental analysis of the magnetorheological elastomer composite behavior under dynamic loading. The elastomer is charged to 40% of ferromagnetic particles. The characterization of the rheological properties was performed and the relation between the loads and the applied magnetic field has been studied. The results found show that this composite presents strong energy dissipation, further accentuated by the structure and the magnetic field.

Keywords:*Magnetorheological elastomer, Silicon, Dynamic loading, Rheological properties, Energy dissipation.*

Corresponding author's:s.aguib@univ-boumerdes.dz
sciencesconf.org:ncmm2023: T07-2023076

ANALYSIS OF HIGH VELOCITY OBLIQUE IMPACT ON HONEYCOMB SANDWICH PANELS WITH FGM SKINS

Amine SMAHAT1 , Abdeljelil MANKOUR1, Kouider BENDINE2, El habib BENSIKADDOUR1

1 Department of Research in Space Mechanics, Satellite Development Center, Algeria 2 Faculty of Technology, Djillali Liabes University of Sidi Bel-Abbes, Algeria

Abstract

This paper examines high-velocity oblique impact, a critical phenomenon in the field of space exploration, focusing on its effect on honeycomb sandwich panels. These panels, equipped with Functional Graded Material (FGM) skins, play an essential role in the design of light and resistant space vehicles. Functionally Graded materials are known for their ability to provide optimal mechanical properties at different locations, making them valuable for spatial design. The paper explores how these properties influence the response to oblique impacts, taking into account factors such as angle of incidence, orbital velocity and honeycomb sandwich panel structure. The study aims to analyze the ballistic performance of these structures in the face of oblique impacts, by simulating impact conditions similar to those encountered in low Earth orbit. The results of this research contribute to improving our understanding of the impact resistance of honeycomb sandwich panels with FGM skins, which is essential for the design of robust and lightweight structures for space vehicles. This knowledge is crucial to guarantee the safety of space missions and the integrity of equipment in Earth orbit.

Keywords:*Oblique impact, Angle of incidence, Orbital speed, FGM, Honeycomb, Sandwich panel..*

Corresponding author's:aminesba13@hotmail.fr
sciencesconf.org:ncmm2023: T07-2023077

SYNTHESIS AND CHARACTERIZATION OF NEW POLYMER COMPOSITE MATERIALS

Naziha Sid -Sahtout1, Amina Missoum 2, Nabila Boudina

1Laboratory of Environmental Sciences and Techniques, Ecole Nationale Polytechnique, Algiers, Algeria . 2Research Laboratory on Bioactive Products and Biomass Valorization, Higher normal School Cheikh Mohamed El-Bachir El- Ibrahimi, Vieux-Kouba – Algiers

Abstract

The aim of this study is a synthesis, material polymer composites materials by an immersion-precipitation method using Cellulose acetate (CA) as membrane matrix, Polyvinylpyrrolidone (PVP) as pore forming agent and commercial Powdered Activated Carbon (PAC) as adsorbent additive. All the components were dissolved in N-methylpyrrolidone (NMP) to prepare the casting solutions. The effect of the PAC on the structure and the performance of the polymer composite membranes were studied. The obtained polymer composite membranes were characterized by scanning electron microscopy (SEM),differential scanning calorimetry (DSC), X-ray diffraction and infrared spectroscopy (FTIR-ATR). Results of all characterization techniques revealed homogenous and significant blending of CAP content into the pure CA matrix. It was found that all the CA/CAP Composite membranes had higher porosity, more vertically finger like pores than CA membrane. With an increase in CAP content in the casting solution from 0.1% to 0.3%. DSC scan and FTIR analysis confirmed that CA was trapped in the membrane matrix.

Keywords:*polymer composites, Cellulose acetate (CA), Thermal analysis, X-ray diffraction, FTIR-ATR..*

Corresponding author's:nasahtout@gamil.com
sciencesconf.org:ncmm2023: T07-2023079

EXPERIMENTAL STUDY OF MECHANICAL BEHAVIOR IN SHEAR AND BENDING TEST OF SANDWICH PANELS

A. Djellab 1, A. Chellil 2,S. Lecheb2,B. Safi 3, A. Houari2, H. Mechakra2, H. Kebir 4

1 LEMI Laboratory , 2 LDMV Laboratory , 3 URMPE Research Unit , 4 Compiègne University of Technology, Roberval LaboratoryRue Compiègne, France

Abstract

This study focuses on the competing collapse mechanisms for composite laminates subjected to tensile tests and sandwich beams simply supported with composite faces subjected to three-point bending tests. The faces comprise two different weights of glass taffeta fabric, an 8-beam satin fabric of the BMS 9-3 Style 7781 type and a single-weave dry carbon fabric (BMS 9-8 3K-70) is also used in this work. The mechanical properties of the surface sheets are measured independently, laminates and sandwich panels are produced by vacuum infusion of epoxy resin, tensile and bending tests and three-point tests are carried out according to the methods of current standards.

Keywords:*sandwich beams , laminates , bending , epoxy resin, tensile , carbon fabric , glass fabric ..*

Corresponding author's:a.djellab@univ-boumerdes.dz
sciencesconf.org:ncmm2023: T07-2023080

MULTI-OBJECTIVES OPTIMIZATION OF COMPOSITE LAMINATE STRUCTURES USING NSGA-II AND FINITE ELEMENT ANALYSIS

Abdelkader BENKHETTOU 1, Omar KHATIR 1, Ismail BOUDJEMAA 1, Abderahman SAHLI 1

1Laboratory Mechanics Physics of Materials (LMPM), Department of Mechanical Engineering, University of Sidi Bel Abbes, BP 89, cite Ben M'hidi, Sidi Bel Abbes, 22000, Algeria.

Abstract

With their lightweight character and high rigidity, composite laminates have increased importance in many engineering fields. The goal of this work is to investigate and optimize composite laminates by taking into account the thicknesses and orientation of layers contained in composite laminates to achieve better rigidity to deflection according to the total mass of the composite structure. Multi-objective optimization was performed to achieve the optimum design of a laminate with less weight and greater flexural stiffness. The winding thickness and angles of the composite layers are chosen as design variables. The maximum elastic displacement proposed and minimum possible weight in design are two constraints that have been carried out. The optimization work was performed by coupling NSGA-II with FEA software. Optimization results can lead to a set of optimal solutions. Each has its own configuration, depending on the thickness and orientation of the layers. This method guides the design of a lightweight composite laminate structure for engineering applications of different complexity and design.

Keywords:*Composite Materials, Optimization,Multi-objectives Optimization, Laminate, lightweight.*

Corresponding author's:aekben.dz22@gmail.com
sciencesconf.org:ncmm2023: T07-2023081

STUDY OF MECHANICAL BEHAVIOR OF A BIO-COMPOSITE MATERIAL

Lakhdar Hafsi 1 , Moussa Guebailia 2

1-2 Applied Mechanic and Energy Systems laboratory, Kasdi Merbah University

Abstract

In this work, we are interested in studying the mechanical properties of American agave fibers. This plant grows in Algeria in several regions. For the first time, we have extracted fiber from this plant. Then we dried these fibers, and these fibers are used in the composition of materials that contain resin, which are used in various industries. In the extraction method, we used three methods: mechanical, biological and traditional; the tensile experiment showed us how much force fibers alone can withstand. The average diameter of these fibers is 300 µm; It allowed us to calculate the pressure, Strength and deformation. We then improved these results by using these fibers as a reinforcement material in the composite material. Composite materials consist of a reinforcement and a matrix whose mechanical properties improve when natural fibers are used.

Keywords:*Natural fibres, Agave Americana, Bio-composite, Tensile test.*

Corresponding author's:hafsi.lakhdar@univ-ouargla.dz
sciencesconf.org:ncmm2023: T07-2023084

DEVELOPMENT AND CHARACTERIZATION OF A COMPOSITE MATERIAL BASED ON EPOXY RESIN AND MINERAL FILLERS (SILICA)

Rabab ZAOUI, Ahlem DJAIT

Dynamic Motors and Vibroacoustic Laboratory, M'Hamed Bougara University of Boumerdes.

Abstract

The study focuses on investigating the impact of mineral loads, specifically silica, on the mechanical properties of epoxy resin-based composite materials. The primary goal is to develop composites with varying silica percentages to ascertain whether mineral fillers enhance the final properties of the resin, particularly its mechanical aspects, while maintaining the intrinsic properties of the host matrix. An additional objective is to determine the optimal percentage for optimizing the mechanical properties of the epoxy/silica mixture. To delve deeper into the topic of silica, the study examines active rates of 0%, 1%, 3%, 5%, and 7%. The research revolves around the preparation and mechanical characterization, specifically tensile testing, of epoxy/silica composites. Findings underscore the positive impact of silica on improving epoxy resin properties, with the composites containing 3% and 5% silica exhibiting the most favorable mechanical properties according to tensile test results. Results reveal an increase in rupture stress and elastic modulus, coupled with a simultaneous decrease in elongation at rupture as the silica content in the epoxy/silica mixture rises. However, the study identifies a limit to the silica content, beyond which positive effects reverse due to uneven dispersion, leading to the formation of agglomerates and adversely impacting the overall material. Additionally, the loads exhibit the ability to enhance mechanical properties by increasing rigidity, with this improvement correlating with the increase in the load rate. The study concludes that silica imparts unique properties to epoxy resin, contributing to both enhanced mechanical characteristics and cost reduction in composite material outcomes.

Keywords:*Resin epoxy, Mineral load, Mechanical properties, Silica, Composite material.*

Corresponding author's:r.zaoui@univ-boumerdes.dz
sciencesconf.org:ncmm2023: T07-2023085

SYNTHESIS AND CHARACTERIZATION OF NANOMATERIAL (AG-OXIDE PILLAR/CLAY).

Halima CHERIFI-NACI

Research Laboratory of Soft Technology and Valorization, Physic-Chemical of Biological Materials and Biodiversity, Faculty of Sciences, Boumerdes University. Algeria

Abstract

To expand the domain of clays application as nanocomposite; it is necessary to treat the problem of their leaf's closure, speaking to 200 ° C. The possibility of incorporating multivalent or bulky cations allows clays to increase their surface acidity or their porosity and thereby become acidic molecular sieves with large pores. Ag-nanocomposite clay was synthesized using AgNO3 solution as pillaring agent at pH 8 and 10-3 mol/L Ag + concentration, reduced Ag+ into Ag° nanoparticles on montmorillonite by using trisoduim citrate (Na3C6H5O72H2O). The Ag-nanoparticles intercalated into the montmorillonite interlayers, which formed Ag-PILC, has a high specific surface area and basal spacing, it is expected to own a stronger PILC structure than the PILCs synthesized through ion exchange method. The pillaring clays contain total surface acidity that varies with the pillaring agent which can be studied by IR spectroscopy using pyridine or n-buthylamine adsorption-desorption process. The experimental study consists to designate the optimal activation conditions (concentration: 4.5 M at temperature T = 80° C, activation time = 3h, adsorbed H2SO4 = 1.85 meq / g clay, CEC = 62 meq/100 g clay) to obtain an adequate activated bentonite which is ready for pillaring operation .Modified clay were characterized by different techniques which was /(XRD, XRF) and physic-chemical analysis (Cation exchange capacity; CEC, specific surface area; SBET).Silver pillared material was synthesized from activated bentonite at 4.5 M/T=80°C using the AgNO3 solution as pillaring agent. Silver pillar clay was characterized by physic-chemical analysis (XRD, CEC, surface acidity, specific surface area, Average pore diameter and density). The d-spacing for the intercalated clay and silver pillar is respectively in 40.5 A° and 38.25 A°. The specific surface areas of silver pillared clay and natural clay are respectively in 390 and 65 m 2 /g order. With specific properties, the complexing clay matrices are highly reactive nonmaterials and can be used in industrial wastewater treatment process and can be used as resin for dental treatment.

Keywords:*Synthesis, nanomaterial , Characterization, nanocomposite, Ag-Oxide Pillar..*

Corresponding author's:cherifi1ch@gmail.com
sciencesconf.org:ncmm2023: T07-2023086

BUCKLING ANALYSIS OF FUNCTIONALLY GRADED BEAMS USING THE DIFFERENTIAL QUADRATURE FINITE ELEMENT METHOD BASED ON REFINED BEAM THEORY

Ihab Eddine HOUALEF, Ismail BENSAID, Ahmed SAIMI.
IS2M Laboratory, University Abou Bekr Belkaid Tlemcen, Algeria

Abstract

The present study developed a Differential Quadrature Finite Element model according to refined higher-order shear deformation beam theory for the buckling analysis of functionally graded (FG) beam by considering the agglomeration effect of single-walled carbon nanotubes (CNTs) and different patterns CNTs in polymeric matrix. The material properties of the FG beams are estimated by using the Eshelby–Mori–Tanaka approach based on an equivalent fiber. For the calculation of kinetic energy and stiffness energy, the higher-order shear deformation beam theory was used, and the matrices of elements and systems are developed using Differential Quadrature Finite Element Method (DQFEM) derived from the differential quadrature method (DQM). Equilibrium equations of the FG beam are obtained by employing Hamilton's principle. The results are compared with analytical results in the literature. It is remarked that mechanical properties and therefore critical buckling loads of FG beams are seriously affected by CNTs agglomeration. Several aspects of beam types, carbon nanotube volume fraction, boundary conditions, etc., are taken into investigation.

Keywords:*FG beam, Buckling analysis, DQFEM, CNTs, Agglomeration effect of CNT, refined higher-order beam theory..*

Corresponding author's:ihabihabeddine1@gmail.com
sciencesconf.org:ncmm2023: T07-2023087

COMPOSITE NANOARCHITECTONICS OF GRAPHENE OXIDE FOR BETTER UNDERSTANDING ON STRUCTURAL EFFECTS ON PHOTOCATALYTIC PERFORMANCE FOR METHYLENE BLUE

BOUIDER Badiaa 1, KERAKRA Samia1, HAFFAD Slimane1, HABI Abderrahmane1, BOUAKAZ Boubkeur Seddik1

1Laboratoire des Matériaux Organiques, Faculté de Technologie, Université A. Mira de Bejaia, Algérie

Abstract

The synthesis of metal organic frameworks/ graphene oxide composites (MOF/GO), and their utilization for the remediation of organic dyes have been received much attention because of their economic, safety, and environmental points of view. The aim of the present study was the synthesis and structural characterization of MOF/GO composites and the analysis of their morphology and photocatalytic activities. The MOF/GO composites have been synthesized by in situ growth. The structural investigation of the synthesized composites was carried out using X-ray diffraction (XRD), Fourier transforms infrared radiation (FT-IR), scanning electron microscopy (SEM) and UV-Visible. Meanwhile, their photocatalytic activities were investigated, using various models, by the degradation of methylene blue (MB) under solar irradiation. The degradation of methylene blue was performed under varying conditions of pH and mass ratio. Our results indicate that, MOF-5/GO achieved 92% degradation at pH=6.8 of MB.

Keywords:*MOF/GO, Methylene blue, Wastewater, Photocatalysis..*

Corresponding author's:badiaa.bouider@univ-bejaia.dz
sciencesconf.org:ncmm2023: T07-2023161

STUDY OF THE EFFECT OF THE SHAPE FACTOR AND THE ORIENTATION ANGLE OF THE FIBERS ON THE STRESS CONCENTRATION FACTOR IN THE ORTHOTROPIC/ISOTROPIC PLATES OF AN AIRPLANE WING

Ishak BERKANE *1, Zohra LABED 2, Lina SAIFI 3

1,2,3 University of Mentouri Constantine brothers 1 Mechanics Laboratory, Department of Mechanical Engineering, Faculty of Technology

Abstract

The aircraft wing is that complicated structure found on the aircraft due to its complicated behaviour towards different loads and manoeuvres.The wing rib with cut-outs reduces the weight and can bear more load.Stress concentration in an elastic body can be caused mainly by two mechanisms, namely concentrated loads or forces acting on a body and geometric discontinuities in a body such as holes or a sudden change in its surface geometry. The presence of cut-outs in aircraft wing ribs creates a concentration of stresses, which ultimately reduces the mechanical strength of the structure. In this work, to obtain equivalent stresses and strains for a wing rib without a cut-out and with a circular cut-out, we considered a perforated plate as the test piece. We studied the stress concentration factor around a central circular hole in isotropic and orthotropic rectangular plates subjected to tensile loading using the finite element method. The present work focuses on the effect of different variables: the plate diameter-to-width ratio (d/W), the effect of the fibre orientation angle (θ°), the effect of the length-to-width ratio (L/W) on the overall and net stress concentration factor around the hole in isotropic and orthotropic plates. ABAQUS software is used as design software to extract stress concentration factors for various materials such as 2024-T3 aluminium and glass/epoxy. These results were then compared with the program formula using MATLAB as the programming software, and a good correlation of results was obtained for both types of material.

Keywords:*Aircraft wing 1 ,rib 2, stress concentration factor 3 ,isotropic plates and orthotropic plates 4 , Heywood and Howland constitutive equations 5 , fiber orientation angle 6 , ABAQUS 7 , MATLAB 8.*

Corresponding author's:ishak.berkane@doc.umc.edu.dz
sciencesconf.org:ncmm2023: T07-2023177

Study on impact behavior of composite sandwich with foam core

B.tablit1 ,A.chellil2,A.houari2,S.lecheb2,C.brihmat1,H.mechakra

1 laboratoire mécanique des solides et des systeme,université MHamed bougara boumerdes .2 laboratoire dynamique des moteurs et vibroacoustique universités MHmed bougara boumerdes.

Abstract

Sandwich composite panels are widely used in aerospace and civil structures consiste of two thin fixer renforcer composite face sheets bonded to a trick.light Wright.foam core,one of the main concerne in the application of sandwich composite structures is the fact their load carrying ability May be significatly reduced by the presence of a local damage .in this study of composite sandwich by FEA finit element analyses in dynamical part the first ten modes shapes,secondly in this work the work the gol is to What extent the stiffness is added foam core in core in composite structure in impact.

Keywords:*Composite sandwich, fréquences,impact,foam core..*

Corresponding author's:tablitbassima@gmail.com
sciencesconf.org:ncmm2023: T07-2023181

THE EFFECT OF TEMPERATURE ON THE MECHANICAL CHARACTERIZATION OF BIO COMPOSITES

Sami SALHI *1, Abdelhakim DAOUI 1, Ibrahim 1 SAFI 1

1 Unité de recherche Matériaux, Procédés & Environnement (UR\MPE) Boumerdes university

Abstract

The major lock of the production of the natural fiber composites is to integrate hydrophilic character fibers into polymeric matrices generalities of hydrophobic nature. The increasing use of composite materials creates resulting waste management problems. We are therefore moving more and more towards the implementation of biodegradable products, either by using biodegradable polymers, or by incorporating biodegradable fibers into polymeric materials. The latter requires in most cases a stage of accounting by chemical treatment of the fibers, in order to improve the adhesion between the matrix and the reinforcement. Various treatments of plant fibers allow the modification of their surfaces. These treatments reduce water retention, improve fiber anchoring, create a strong bond at the fiber-resin interface and therefore give better mechanical properties of composite materials. Improving the adhesion between the fabric and the matrix that is our essential goal, the jute fabrics are deposited in alkaline treatments of 5% NaOH for 2 hours for different temperatures that vary from 90°C to 200°C. As well as, the mechanical tensile behavior of jute/polyester fabric composites. The tensile strength is better at 90°C compared to the other temperatures. This indicates that the treatment with NaOH at 90°C leads to a better modification of the mechanical properties of composite.

Keywords:*Polyester; vegetable fiber; chemical treatment; thermal effect and vacuum molding.*

Corresponding author's:sam.salhi@univ-boumerdes.dz
sciencesconf.org:ncmm2023: T07-2023193

ANALYSIS OF DAMAGE TO A 2024-T3 ALUMINUM STRUCTURE IN THE PRESENCE OF A V NOTCH REPAIRED BY COMPOSITE PATCH USING XFEM-CZM / XFEM-VCCT TECHNIQUES

S. CH. Djebbar1a, N. Kaddouri1b, K. Madani1c, M. Belhouari1d, M. Elajrami1e and R.D.S.G. Campilho2,3f

djillali liabes university of sidi bel abbes

Abstract

During their use, metallic structures are exposed to various mechanical stresses which, in the presence of geometric discontinuities, lead to a failure at the level of these zones of strong concentration of stresses. The repair by the process of bonding composite patches of these damaged structures is very widespread to prolong the life of the structures by reducing the concentration of stresses. Carrying out mechanical tests on damaged and repaired structures is sometimes expensive, which has prompted researchers to develop new techniques for modeling damaged and repaired structures such as XFEM, CZM and VCCT.This work is part of this context, the objective is to analyze the damage of Al2024-T3 structure in in the presence of a V notch repaired and not by composite patch of type carbon / epoxy using the techniques cited above. The numerical results of the force-displacement curves will be compared and validated by the results of the mechanical tests. The initiation and propagation of the crack in the aluminum plate is modeled by the XFEM method, which uses the maximum principal stress criterion (MAXPS) for the prediction of the damage initiation. However, the damage to the adhesive layer is modeled by CZM and in a second case by VCCT.A good agreement was found between the experimental and numerical results of the tensile curves of the repaired and unrepaired plates

Keywords://.

Corresponding author's:koumad10@yahoo.fr
sciencesconf.org:ncmm2023: T07-2023219

TENSILE PROPERTIES AND FRACTURE MECHANISM IN POLYAMIDE-12 NANOCOMPOSITES REINFORCED WITH GRAPHENE NANOPLATELETS AND NANOCLAY

Fath Eddine Zakaria Rahmaoui , Nourredine Aït Hocine, Idir Belaidi , Pascal Mederic

Research Laboratory of Advanced Technology in Mechanical Production (LRATPM), Mechanical Engineering Department, Faculty of Engineering Sciences, Badji Mokhtar-Annaba University

Abstract

Nanocomposites based on polyamide-12 matrix with nanoscale reinforcement (graphene nanoplatelets and nanoclay) are prepared by melt compounding. We report the synergistic reinforcement of polyamide-12/graphene/nanoclay nanocomposites with the tensile properties being improved greatly. Particularly, the modulus of composite with 5wt% of graphene and 5wt% of nanoclay were improved by more than 75% when compared to the neat polyamide-12. However, it is noteworthy that when we introduce fillers even at low percentage, a significant reduction in strain at break is observed. This phenomenon can be attributed, in part, to the reaggregation of graphene nanoplatelets. Microstructural observations were carried out on the fracture surface of hybrid nanocomposite and clearly show the origin of the brittle fracture. We present a hypothesis explaining the mechanism behind the fracture behaviour observed in these highly filled nanocomposites.

Keywords://.

Corresponding author's:fatheddine-zakaria.rahmaoui@univ-annaba.dz
sciencesconf.org:ncmm2023: T07-2023222

NUMERICAL ANALYSIS OF THE EFFECT OF FORCES ON THE CRACK IN A COMPOSITE PLATE IN ABAQUS SOFTWARE

Khalissa Saada , Salah Amroune , Moussa Zaoui
Univercity of msila

Abstract

Composite materials are extensively utilized, but they are susceptible to deterioration over time, leading to damage. This study investigates the cracking processes of composite sheets reinforced with jute fiber under uniaxial tension, employing Abaqus software. The experiments involve varying displacement speeds at 10, 20, and 30 mm/min. The composite plate dimensions are 25×35×10 mm³ with a 7 mm crack length. Findings indicate that crack propagation in vehicle plates is influenced by mechanical properties in relation to load, especially with increased travel speed. Stress concentrations around the crack are noted, and the displacement speed has a discernible impact on crack behavior. Utilizing finite element analysis, the cohesive J-integral is obtained. The calculation results for the integral paths of the two sample types reveal a 90.90% relative error in the mean absolute value ΔJ

Keywords:*Abaqus , J-integral, traction, crack, composite.*

Corresponding author's:khalissa.saada@univ-msila.dz
sciencesconf.org:ncmm2023: T07-2023231

DAMAGE AND REPAIR OF COMPOSITE STRUCTURES

MAHSEUR Samah, LECHEB Samir, MECHAKRA Hamza; CHELLIL Ahmed
Faculty of Technology University M'Hamed bougara boumerdes

Abstract

The degradation of the mechanical properties of strategic structures can have catastrophic consequences if the problem is not effectively solved, and if advanced repair technology is not developed. Our study is mainly devoted to the repair of components, metal or composite structures. Structures damaged by fatigue or impact can be repaired by patch of composite material, to increase rigidity and reduce stress intensity, displacement, deformation as well as natural frequencies. Our study aims to find the ideal shape and type of patch to use in relation to the detected failure in the structure, using numerical simulation and experimentation.

Keywords://.

Corresponding author's:s.mahseur@univ-boumerdes.dz
sciencesconf.org:ncmm2023: T07-2023232

EXPERIMENTAL CHARACTERIZATION OF COMPOSITE MAGNETORHEOLOGICAL ELASTOMER

Kozili Lallia, Aguib Salah, Chikh Noureddine, Nour Abdelkader, Djedid Toufik, Réda Guedifa

Dynamic Motors and Vibroacoustic Laboratory, Faculty of Technology, University of Boumerdes35000, Algeria.

Abstract

This work presents an analysis experimental of dynamic properties of composite magnetorheological elastomer (CMRE) by a dynamic mechanical analyzer (DMA). The charge of magnetized iron particles is 30% of the total volume. A dynamic mechanical analysis DMA was carried out, in the scanning mode of the amplitude of shear strain, and for magnetic field densities varying from 0mT to 325mT. The storage modulus G' and the loss modulus G'', of the elastomer decrease, when the amplitude of the strain increases. This trend is more pronounced under a higher magnetic flux density (250mT and 325mT). In the presence of the magnetic field, the level of these two dynamic moduli and of the damping increases considerably, passing from one value to another of the applied external magnetic field. As a result, the MR effect of MRE elastomers has increased significantly with increasing magnetic flux density.

Keywords://.

Corresponding author's:sala.ldmv@gmail.com
sciencesconf.org:ncmm2023: T07-2023260

ANALYTICAL AND NUMERICAL RESOLUTION OF VISCOELASTIC UPPER-CONVECTED MAXWELL FLUID IN COUETTE FLOW WITH THERMAL EFFECTS

Messaouda GUEMMADI1,2 ,Faiza BRAHIMI 1,3, Ahmed.OUIBRAHIM4

1Mechanical Engineering, Faculty of Technology, University of Boumerdes, Algeria
2Mechanical Energetics and Engineering-University of Boumerdes, 35000, Algeria
3Dynamic Motors and Vibro-acoustic- University of Boumerdes, 35000, Algeria
4Mechanical Energet

Abstract

In this study, the commercial software Fluent used in combination with a calculation code developed in C++, via sub-programs defined by User Defined Functions and User Defined Scalars. The purpose of this study is to compare the results with the analytical solution; which makes it possible to validate the numerical results by using the code developed in C++ and also, to give an assurance to use this code in the numerical simulation of several problems in UCM fluid, which does not exist on the data base of the Fluent software. The results obtained in this study, shows the effectiveness of the code developed in C++.

Keywords:*Viscoelastic fluid, UCM model, Computational Fluid Dynamic, Couette Flow, heat transfer.*

Corresponding author's:m.guemmadi@univ-boumerdes.dz
sciencesconf.org:ncmm2023: T08-2023089

INVESTIGATIONS ON THE WEAR BEHAVIOR OF ORGANIC MATRIX COMPOSITE MATERIALS IN DRY FRICTION.

T. Benmedakhene(1) , N. Ouleaa(1), S. Belhadi(1),

(1) Mechanics & Structures Laboratory, Université 8 mai 1945 Guelma.

Abstract

Organic matrix composite materials are used extensively in the automotive industry and in handling equipment (cranes, forklifts, overhead travelling cranes and elevators). Typical applications include brake linings, where the function of stopping movement by braking is crucial to safety and environmental protection. Since the banning of asbestos as an additive in the composition of materials intended for braking, manufacturers have been on a continuous quest to develop a composite with the minimum of environmentally-friendly components. Our comparative experimental study is based on tribological testing of the pin/disc pair on a CSM instrument tribometer of composite materials, one commercial, and the other locally developed. By varying the parameters sliding speed (V) and normal load (P); mass loss, tangential force and coefficient of friction are recorded at each test.Using SEM spectroscopy, microscopic observations of the wear tracks and flow rates, an EDAX analysis of the samples was carried out to evaluate the composition and interpretation of the phenomena observed, with the aim of developing a material with optimum behavior in compliance according to the internationnal standars and normative requirements.

Keywords:*Wear, dry friction, composite materials, tribology, mass loss, EDS.*

Corresponding author's:toufikben2006@yahoo.fr
sciencesconf.org:ncmm2023: T08-2023090

EFFECT OF O2 FLOW RATE ON THE STRUCTURE, WETTABILITY, TRIBOLOGY AND MECHANICAL BEHAVIOURS OF SPUTTERED ZR-O-N THIN FILMS

Linda AISSANI1, 2*, Ahlam BELGROUNE1, 3 Mohamed Said Bouamrene4

1Laboratory of Active Components and Materials,Larbi Ben M'HidiUniversity, Oum El Bouaghi, 04000, Algeria. 2Physics Department, ABBES Laghrour- Khenchela University P.O 1252, 40004, Algeria. 3LASMIS, Université de Technologie de Troyes, Pôle Technologique

Abstract

Wettability and tribo-mechanical properties of Zr-O-N films deposited by reactive magnetron sputtering with a varying flow rate are investigated. The films are characterized using scanning electron microscopy, energy dispersive x-ray analysis, atomic force microscopy, nanoindentation and wear tests. O2 content seem to have a significant effect on the structures, wettability, tribo-mechanical properties of Zr-O-N films. The Zr-O-N films showed a dense structure with a mixture of zirconium oxides and nitrides and the preferred orientation changed from (111) ZrN to (200) ZrN with increasing O2 flow rate. Adding of O2 progressively reduced the lattice parameter and grain refinement from 19.5 to 7.0 nm. The ZrON film deposited exhibited the highest contact angle, highest hardness, and lowest coefficient of friction at 10 sccm of oxygen flow rate. The enhancement in the properties of ZrON film is due to the formation of a hard solid solution.

Keywords:*Magnetron sputtering, Zr-O-N, Microstructure, Wettability, Surface Energy, Nanoindentation, Friction..*

Corresponding author's:linda.aissani@univ-khenchela.dz
sciencesconf.org:ncmm2023: T08-2023091

OPTIMIZING OF DC MOTOR SPEED WITH INTERNAL MODEL CONTROL AND PID-FRACTIONAL ORDER APPROACH

Tassadit CHEKARI, Arezki FEKIK

L2CSP Laboratory, Mouloud Mammeri University of Tizi-Ouzou. Department of Electrical Engineering, University Akli Mohand Oulhadj-Bouria

Abstract

This paper introduces a novel Fractional Order Controller (FOC) known as IMC-PID-FOF, engineered for the accurate control of Direct Current (DC) motor speed. The proposed controller is systematically developed, drawing upon the Internal Model Control (IMC) structure and Bode's ideal transfer function. Comprehensive simulation results are provided to emphasize the impact of non-integer orders and time constants as vital tuning parameters. Furthermore, the performance of the IMC-PID-FOF controller is rigorously assessed regarding its effectiveness in achieving set-point tracking and load torque compensation. This innovative FOC, IMC-PID-FOF, has the potential to significantly enhance the efficiency and precision of DC motor speed control systems, making it a valuable contribution to the field of control engineering.

Keywords:*DC motor, IMC control, Bode's ideal transfer function, PID controller, non integer order.*

Corresponding author's:t.chekari@univ-boumerdes.dz
sciencesconf.org:ncmm2023: T09-2023092

CONSTRAINED SOF FUZZY CONTROL OF QUAD-CAR ACTIVE SUSPENSION SYSTEM

Mohamed Nasri, Farid Belouahchi

LAJ, Faculty of Science and Technology, University of Jijel, Ouled Aissa, Jijel, Algeria.

Abstract

This paper deals with the problem of vibration control in vehicle active suspension systems in the presence of actuator saturation and unavailability of measurement of same state variables. Firstly, a Takagi-Sugeno model for the nonlinear active suspension system is established via a sector nonlinearity method. Then, a quadratic Lyapunov function is used to determinate the stabilisation conditions of H∞ Static Output Feedback control (SOF) in term of Linear Matrix Inequality (LMI). Finally, the simulation results are made to show the effectiveness of the proposed approach.

Keywords://.

Corresponding author's:nasrimoh@ymail.com
sciencesconf.org:ncmm2023: T09-2023207

FUZZY NON-PDC CONTROL FOR ACTIVE SUSPENSION SYSTEM UNDER ACTUATOR SATURATION

Mohamed Nasri, Farid Belouahchi

LAJ, Faculty of Science and Technology, University of Jijel, Ouled Aissa, Jijel, Algeria.
nasrimoh@ymail.com

Abstract

This paper is deals with the problem of improving ride comfort of quad-car active suspension system through an H∞ non quadratic Parallel Distributed Compensation (PDC) controller in the presence of actuator saturation and external disturbances. The nonlinear active suspension system with actuator saturation is represented first by a Takagi–Sugeno fuzzy model in continuous time. Then, a non-quadratic Lyapunov function is used to determinate the asymptotic stabilization conditions via Non-PDC controller in term of linear matrix inequality (LMI). Finally, the proposed control schemes are applied to a quad-car active suspension system. Simulation results show the effectiveness of the proposed control approach.

Keywords://.

Corresponding author's:nasrimoh@ymail.com
sciencesconf.org:ncmm2023: T09-2023208

COOLİNG PERFORMANCE INVESTİGATİON OF PURE LOW-GWP REFRİGERANTS AS SUBSTİTUTES FOR THE PHASE-OUT R134A (1,1,1,2-TETRAFLUOROETHANE) İN COOLİNG SYSTEM : SEARCH FOR AN ADEQUATE REFRİGERANT

Youcef Maalem1, Hakim Madani2

1 Preparatory Classes Department, National Polytechnic School of Constantine, BP75 A, Nouvelle Ville RP, 25000 Constantine, Algeria. 2 Department of Mechanical Engineering, Faculty of Technology, University of Batna 2, 05000 Batna, Algeria.

Abstract

Knowing that from 2030 working fluids used in refrigerating engineering should have a global warming potential (GWP) of less than 150 and zero ozone depletion potential (ODP), searching for eco-friendly working fluids with good cooling performance and minimal environmental impact (Low-GWP and Zero ODP) to substitute the Phase-out R134a (GWP=1430) commonly used in cooling systems represents a great challenge for researchers. This study focuses on energy performance investigation and environmental impact analysis of four pure refrigerants (R1234yf (GWP=4), R1234ze (GWP=6), R161 (GWP=12) and R13I1 (GWP=0)) as possible alternatives to high GWP refrigerant R134a. To reach this objective, a numerical model is developed using MATLAB software to evaluate and compare the cycle performance parameters of the single-refrigerants considered in this work with R134a, like cooling capacity, coefficient of performance, volumetric refrigerating capacity and the pressure ratio. The comparison was made at evaporating temperatures (Te) ranging from (-10 to 10 °C) and the constant condensation temperature (Tc) of 50 °C. The results proved that the application of the working fluid R161 exhibited a higher of COP, cooling capacity, volumetric refrigerating capacity, as well as lower pressure ratio compared with the traditional R134a, which confirms that it could be a good suitable substitute for the R134a in terms of cycle performances and environmental protection.

Keywords:*Pure refrigerants, Low-GWP, Cooling system, Energy efficiency, Volumetric refrigerating capacity..*

Corresponding author's:youcef.maalem@cp.enp-constantine.dz
sciencesconf.org:ncmm2023: T10-2023093

HIGH-ORDER COMPACT NONLINEAR SCHEMES FOR SOLVING COMPRESSIBLE FLOWS

Riadh OUZANI 1, Chaouki LAGGOUN 1, Miloud LAHBARI 1,

1 LESEI Laboratory, Mechanical Engineering Department, University of Batna 2, Algeria.

Abstract

The accuracy solution of compressible flows presented in industrial engineering is a challenging topic due to the strong discontinuities such as shock waves and turbulence multi-scales structures which affected by numerical dissipation. In this current study, we present a comparison of high-order compact schemes WENO and their variants WCNS's for solving compressible flows. The approximate dispersion relation (ADR) analysis is carried out using a scalar conservation law to investigate the superior resolution ability of the schemes. Furthermore, a series of extensive one- and two-dimensional classical benchmark tests (the 1D sod and Lax shock tube tests, Kelvin-Helmholtz instability, the double Mach reflection problem where the strong Mach 10 shock, the Rayleigh-Taylor instability and the Riemann problems) are performed to examine the performance of the presented schemes. These different test cases show the ability of the WCNS's schemes to capture the small-scale structures and strong discontinuities in a robust and stable way in comparison to WENO.

Keywords:*WENO scheme, Shock wave, Compressible flows, Hyperbolic conservation laws.*

Corresponding author's:r.ouazani@univ-batna2.dz
sciencesconf.org:ncmm2023: T10-2023094

NUMERICAL SIMULATION OF FLOW CHARACTERISTICS AROUND A ROTATING PROPELLER

Riadh OUZANI 1, , Chaouki LAGGOUN 1, Miloud LAHBARI 1

1 LESEI Laboratory, Mechanical Engineering Department, University of Batna 2, Algeria.

Abstract

In the present paper, the flow dynamics around submerged propellers has been studies using the open source computational fluid dynamics software Open-FOAM 5.0. The whole computational domain has been meshed using the snappyHexMesh. To capture accurately the flow structure, grids mesh quality and distribution around the blades has been analyzed. Indeed, the hexagonal-mesh elements have been employed with a refinement near the blades regions in order to capture accurately the evolution of the flow structure around the rotating propeller. In this work we focus our attention on the impact of the aerodynamic shape of the propeller on the flow characteristics. The effect of the number of blades has been also investigated. The numerical results show that the number of blades has a significant impact on the flow dynamics and propeller efficiency.

Keywords:*Open-FOAM, Propeller, Blades, SnappyHexMesh, CFD*.

Corresponding author's:r.ouazani@univ-batna2.dz
sciencesconf.org:ncmm2023: T10-2023096

JOB SHOP SCHEDULING PROBLEM WITH BLOCKING AND NO_WAIT CONSTRAINTS

Zineb LISSIOUED 1, Samia OURARI 2, Hacène AIT HADDADENE 3

1,2 LaROMaD Laboratory, University of Science and Technology Houari Boumediene Algeria. 2 LIST laboratory, M'hamed Bougara University of Boumerdes, Algeria.

Abstract

Scheduling system can generally be defined as the process of assigning restricted resources to a set of tasks that have different processing times and that need to be processed according to a given routing. This paper deals with job shop scheduling problem with blocking and no-wait constraints where there is no intermediate buffer between machines. The blocking constraints means that after a completion of an operation, a job remains on its machine, thus blocking it, until the next machine in its routing becomes available for processing. While in the no-wait constraints, the job starts its processing on the machine from the start to the end without any interruption either on or between machines. Our goal is to find a feasible order of operations on machines with the objective of minimising the maximum completion time. This problem is known to be NP−hard (Hall and Sriskandarajah, 1996). In this work, we start by describing the problem, and presenting the disjunctive and alternative graph corresponding to this problem. Some pertinent literature works are given. We will formalize the problem with an integer linear programming model. Numerical experiments on some classicals benchmarks problems are performed in order to show the effectiveness of our model.

Keywords:*Job shop scheduling, Blocking2, No_wait, mathematical model.*

Corresponding author's:lissiouedz@gmail.com
sciencesconf.org:ncmm2023: T10-2023097

Electrical signal processing for mechanical fault detection and diagnosis in asynchronous motor

Ali DAMOU, Azeddine RATNI, Djamel BENAZZOUZ
Mechanical Solids and Systems Laboratory, Boumerdes University

Abstract

This paper presents an efficient approach for signal processing method to detect a mechanical defect using an electrical signal. This approach can be considered similar to the instantaneous power method; however, the proposed approach only requires the use of one current sensor (measurement of current) but the instantaneous power method use of two sensors (line current and voltage). The approach can detect and identify at early stage the induction machine and also the broken bars defects. For this purpose, an electrical model of induction machine is proposed. Simulation results are presented in order to confirm the theoretical assumptions. The results show that Motor Square Current Signature analysis can effectively detect abnormal operating conditions in induction motor applications by minimizing the number of sensors used.

Keywords:*Stator currents —defective rotor bars— Signal Processing —Induction motor.*

Corresponding author's:a.damou@univ-boumerdes.dz
sciencesconf.org:ncmm2023: T10-2023098

DEVELOPMENT OF A NATURAL GAS PIPELINE TRANSPORT SYSTEM (TSP-SONATRACH) USING GENETIC ALGORITHMS

Karim BENALIA 1, Abdelaziz BELHADJ 2, Mohamed ZIGADI 3

1 Faculty of hydrocarbons and Chemistry, University of Boumerdes, Algeria. 2 Laboratory of Operational Research and Mathematical decision, University of Tizi-Ouzou, Algeria. 3 Faculty of hydrocarbons and Chemistry, University of Boumerdes, Algeria.

Abstract

A natural gas transport system by pipeline (TSP) is composed of one or more parallel gas pipelines interconnected bythrough a certain numberof compression stations placed at various distances throughout the TSP in order to give the transported flow the power (pressure) necessary for its routing from the departure terminal (origin) to the arrival terminal (destination). The main objective targeted through this study is to determine an optimal operating regime of the TSP, which makes it possible to maximize the flow rate on arrival in order to satisfy customer demand while minimizing the overall operating cost of the TSP while respecting all operating constraints. To achieve our objective, we will determine the optimal combination of compression stations as well as the optimal number of turbochargers to operate in each station. The analysis of the mathematical model of our problem shows that we are in the presence of a non-linear problem which is a function of continuous and bivalent variables.We plan to use approximate methods such as genetic algorithms for its resolution.

Keywords:*A natural gas transport system , genetic algorithms.*

Corresponding author's:saipemkarim@gmail.com
sciencesconf.org:ncmm2023: T10-2023099

OPTIMIZING SHOP SCHEDULING THROUGH RESOURCE COORDINATION AND ROBUST STRATEGIES

Sara Bouguessa1, Samia Ourari 2

1 Systems Engineering and Telecommunications Laboratory, M'hamed Bougara University of Boumerdes,Algeria.2 Mechanical Engineering Department . M'hamed Bougara University of Boumerdes,Algeria

Abstract

In the present socio-economic environment, production systems operate in a non-deterministic and uncertain environment. Furthermore, the need for flexible organizational frameworks becomes imperative in order to tackle disruptions. Many Research orientations revolve around the implementation of decision support tools and a central axis concerns the scheduling problems. Scheduling problems are considered as NP-Hard due to their combinatorial aspect, and many research efforts were conducted considering a deterministic execution environment. However, in practice, the predictive solution may quickly become obsolete during the real-time execution. Indeed, many parameters are not static but are subject to perturbations (machine failures, arrival of new customer orders). In this context, resolving scheduling problems both offers solutions in deterministic scenarios, an assumption considered restrictive, and addresses the flexibility and robustness challenges in real-time. Our research work deals with job-shop scheduling problem involving multiple machine under an evolutionary environment while minimizing the total duration Cmax of the schedule (makespan). We propose a novel robust approach where sequential flexibility is allowed enabling each resource to manage its robust local schedule, and hence, to handle against uncertainties. The flexibility is linked to the fact that several alternative job sequences are allowed with a best and a worst values of finishing time for each job. However, due to the precedence constraint, the problem of incoherence between local schedules arises. To achieve this, the proposed approach involves defining a model ensuring convergence to a consistent global scheduling. Many experimentations have been done on some benchmarks existing in the literature. The results show the efficiency of the proposed robust approach that allowed characterizing in a very reasonable time, bounds comparable to the known optimal solutions.

Keywords:*Job Shop Scheduling , Coordination, Robust Strategies, Flexibility , Uncertain environment..*

Corresponding author's:sa.bouguessa@univ-boumerdes.dz
sciencesconf.org:ncmm2023: T10-2023100

PROCESS OF EXTRACTING AN ORGANIC MATERIAL FROM CRUDE OIL

Nadia HADJ KADDOUR, Boumedienne BOUNACEUR, Mortada DAAOU

1Université Oran 1 Ahmed Ben Bella, B.P 1524, El M'Naouer, 31000 Oran, Algérie.
2Université des Sciences et de la Technologie d'Oran Mohamed-Boudiaf, El Mnaouar, BP 1505, Bir El Djir, 31000 Oran, Algérie

Abstract

Asphaltene a complex aromatic molecule, is largely contained in petroleum and coal processing residues, it is considered the heaviest part of the petroleum. Since oil is transported in pipelines and metal equipment in general, the asphaltene can precipitate in the presence of ferric ions combined with acidic conditions, blocking and obstructing the free flow of the petroleum, which has a large blocking capacity of the porous spaces of the deposit, causing a reduction in the permeability and a remarkable decrease in the output flow of the petroleum. The main idea of this research work focuses on the extraction of organic pollutants from Algerian petroluem (asphaltene-resin). This study could lead to characterize the interactions between the two compounds in different solvents of different polarities. According to the experimental protocol recommended by the AFNOR T 60-115 standard, asphaltenes correspond to the fraction insoluble in normal heptane at its boiling point, but soluble in hot benzene using an organic solvent (n-heptane). To do this, this method will be used to extract asphaltenes from a petroleum residu. The main objective of this work is to solubilize asphaltenes, we studied the effect of the addition of a natural inhibitor, the resins on the precipitation of asphaltenes, both extracted from a residue of petroleum collected at the refinery Arzew. Toluene and n-heptane were used, respectively, as dispersants and flocculants to determine the occurrence of asphaltene precipitation using a UV-visible spectrophotometric method. The flocculation threshold is an essential parameter for characterizing the stability of petroleum. For this reason, its experimental methods for detecting it are of practical interest for the purpose of minimizing the blockage of porous spaces, and thereby increasing the flow of production.

Keywords:*petroleum ; flocculation ; spectrophotometry ; asphaltene ; resin..*

Corresponding author's:nadouhk31@gmail.com
sciencesconf.org:ncmm2023: T10-2023101

EFFICIENT CYBERSECURITY PROTOCOLS FOR INDUSTRIAL SYSTEMS

Chahrazad ADICHE1, Latifa HADERBACHE2

1 Operational Research and Decision Mathematics Laboratory, USTHB, Algeria. 2 Food Technology Research Laboratory, M'Hamed Bougara University of Boumerdes, Algeria.

Abstract

Faced with the security challenges of Industry 4.0, industrial cybersecurity represents a major opportunity in the process of identifying, assessing, and managing potential internal or external risks associated with industrial activities. The aim is to reduce these risks to acceptable levels and preserve the company's future and the interests of its customers. A cyberattack on an industrial system could lead to disastrous failure of the factory's main equipment, and expose people to dangerous situations. Since 2021, ransomware attacks have significantly disrupted the manufacturing industry. Indeed, in many countries around the world, cyberattacks are increasingly targeting pharmaceutical companies, defense equipment manufacturers, power plants, water treatment plants, etc. The National Institute of Standards and Technology (NIST) has published the first draft of the Operational Technology Security Guide (NIST SP 800-82r3 ipd). This guide provides an overview of Operational Technology (OT) and its topologies, identifies typical OT threats and vulnerabilities, and provides recommended security measures and countermeasures to manage the associated risks. According to ISO 27001v2022, the three essential properties to maintain security are confidentiality, integrity, and availability. This work proposes a multi-objective optimization-based approach to determine a set of efficient Cybersecurity protocols for Industrial Systems. This is an approach that seeks to optimize multiple objectives simultaneously, such as maximizing returns and minimizing risks, while satisfying various constraints. In addition, the efficiency of the proposed method is evaluated and compared to the classical one on some available data sets in the literature.

Keywords:*Industrial cybersecurity 1, Industry 4.0 2, Multi-objective optimization 3, Combinatorial optimization 4, ISO 27001 5..*

Corresponding author's:c.adiche@univ-boumerdes.dz
sciencesconf.org:ncmm2023: T10-2023158

OPEN-PHASE FAULT DETECTION AND DISCRIMINATION IN A PERMANENT MAGNET SYNCHRONOUS MOTOR DRIVE SYSTEM

Belhout SAMIHA, Dr. Kaddouri Ameur Miloud, Pr.Kouzou Abdellah

Applied Automation and Industrial Diagnostics Laboratory (LAADI), Djelfa University, Algeria

Abstract

In order to guarantee safety and continuity of service of the control systems, a control technique hasbeen developed called Fault-Tolerant Control (FTC), which allows detection and isolation of faults, as well as the reconfiguration of the control system, to ensure continuity of service and to protect the healthy elements of the control loop from the effects of faulty ones. Certainly, several studies have been carried out on this subject in different Open-phase fault in permanent magnet synchronous motor (PMSM) drive system occurs as the phase winding is disconnected or one leg of the inverter bridge fails. It may generate large electromagnetic torque ripple and serious mechanical vibration. Therefore, a rapid fault detection method is greatly required to identify this fault at early stage and prevent damage to the system. This paper develops a method of the open-phase fault detection and discrimination for the PMSM drive system based on the zero-sequence voltage components, in which the discrimination of the fault types, namely internal stator winding failure and switches failure of the inverter is realized. Then, appropriate fault-tolerant measures may be taken according to the different fault types. The experimental platform is established, and the experimental results verify the effectiveness of the proposed method, showing that not only the open-phase fault can be rapidly detected, but also the fault type can be effectively discriminated.

Keywords:*fault-tolerant control, fault detection and isolation, permanent magnet synchronous machine (MSAP), FTC control , Open-phase fault..*

Corresponding author's:samiha.belhout@univ-djelfa.dz
sciencesconf.org:ncmm2023: T10-2023167

DIABETIC RETINOPATHY DETECTION AND CLASSIFICATIONUSING VGG16 AND EFFICIENTNETB0

Wissam Bouaraki1, Yasmine Guerbai 1, Manel Bida 1

1-Electric Department, University of M'hamed Bouguera (UMBB), Boumerdes,Algeria

Abstract

Diabetic Retinopathy (DR) plagues millions of people globally, presenting a critical eye condition that demands early detection and diagnosis to thwart vision loss and bolster patient outcomes. The advent of Artificial Intelligence (AI) has upended the medical field, offering a promising solution to the early detection of diseases. Our study delves into the significance of AI in the early detection of diabetic retinopathy and evaluates the efficacy of two convolutional neural network (CNN) pre-trained models - VGG16 and EfficientNetB0 - through fine- tuning and transfer learning in the detection of DR and non-DR images. We employed two datasets, with different formats RGB and filtered Gaussian images obtained from Kaggle, to educate and appraise the models. Our results revealed that VGG16 with fine tuning and EfficientNetB0 with transfer learning achieved 95.21% and 97.54% accuracy, respectively, a testament to their effectiveness in detecting diabetic retinopathy.

Keywords:*VGG16, EfficientNetB0, Diabetic, retinopathy..*

Corresponding author's:y.guerbai@univ-boumerdes.dz
sciencesconf.org:ncmm2023: T10-2023401

L'ÉCOSYSTÈME DES PROJETS INNOVANTS (START-UP – PME)

DAOUI Abdelhakim 1

1- Responsable Bureau de Liaison Entreprises Université (BLEU), Université M'Hamed Bougara Boumerdes

Abstract

La valorisation de la recherche consiste à rendre utilisables ou commercialisables les résultats, les connaissances et les compétences de la recherche, via une mise en relation du monde de la recherche et du monde socio-économique L'Algérie vient de recenser plus 5000 Start-up dont près de 1100 ont obtenu le Label « Start-up » ou celui de « Projet Innovent » ou le nombre d'incubateur actifs sur le territoire national serait lui, passé de 14 à 94 au cours de ces trois dernières années. En effet, l'accélération de la croissance économique exige l'intégration des technologies nouvelles, la digitalisation des administrations, l'autosuffisance alimentaire et hydrique, et aussi et surtout de promouvoir tout azimut, l'innovation et l'entreprenariat en ligne de mire l'employabilité dans nos entreprise de production, nos Universités et nos Ecoles. Étant donné que l'employabilité fait partie des priorités des politiques tant qu'au niveau régional et ou international, à l'exemple de l'Algérie qui figure parmi les pays ayant adoptée la synergie entre le développement de l'environnement de l'entreprise dans toute sa diversité entrepreneuriale afin d'asseoir un tissu industriel pouvant contribuer à la politique de l'employabilité à partir d'un rapprochement entre l'université et l'entreprise. C'est ce qui vaut aujourd'hui l'émergence des PME (Petites et Moyennes Entreprises) telles que les start-up qui occupent une place primordiale dans les orientations du Président de la République. L'écosystème est appelé à faire l'objet d'un triptyque : "UNIVERSITÉ – ENTREPRISE - ECONOMIE DE LA CONNAISSANCE POUR LE DÉVELOPPEMENT DES TART-UP". Aujourd'hui l'université ne peut se désengager de son rôle central pour rapprocher l'ensemble des secteurs économiques pour soutenir la politique de création des Start-up et des PME et contribuer à mettre en place un espace favorable appelé écosystème.

Keywords:*Écosystème, entrepreneuriat, start-up, tissu industriel, économie.*

Corresponding author's:a.daoui@univ-boumerdes.dz
sciencesconf.org:ncmm2023: T10-2023402

ENTREPRENEURSHIP IN THE SERVICE OF SCIENTIFIC RESEARCH VALUATION

Amina Meziane

1- Responsable Bureau de Liaison Entreprises Université (BLEU), Université M'Hamed Bougara Boumerdes

Abstract

Our research paper focuses on the theme of valuing scientific research, especially at the universities, where a lot of great ideas and technological advancements are often overlooked due to not being harnessed and valued. This is achieved through various mechanisms aimed at enhancing the value of scientific research results and innovative ideas. Collaboration with university interfaces who play a crucial role in supporting and guiding the valuation process, particularly in the form of startups such as business incubators, Entrepreneurship Development Center CDE, Technology and Innovation Support Center CATI, University-Industry Liaison Office BLEU. These interfaces aim to support and accompany students with innovative ideas through many activities such as awareness campaigns, training, guidance, and mentoring activities

Keywords:*scientific research; commercialization (valorization), entrepreneurship, innovation, startups,*

Corresponding author's:minamez03@yahoo.fr
sciencesconf.org:ncmm2023: T10-2023403

NANOFLUIDS AND HYBRID NANOFLUIDS: COMPARATIVE STUDY OF NATURAL CONVECTION IN A ROUND BOTTOM FLASK.

SALHI Hicham1 ,OUZANI Riadh2

1Laboratory of Applied Research, Department of Hydraulics, University of Batna 2, Algeria. 2 LESEI Laboratory, Mechanical Engineering Department, University of Batna 2, Algeria.

Abstract

This research project focuses on the numerical investigation of the natural convection of Hybrid nanofluids in a round bottom flask commonly used in organic chemistry synthesis. The aim of this study is to improve the thermal properties of the reaction medium and enhance the rate of chemical reactions by using hybrid nanofluids. The flat bottom wall of the flask is maintained at a constant high temperature, while the top, left, and right walls are kept at a low temperature. The nanofluids used in this study contain suspended Cu and Al2O3 nanoparticles in pure water. The governing equations are solved numerically using the finite-volume approach and the Boussinesq approximation. The effects of the volume fraction of nanoparticles (φ) ranging from 0% to 5%, the Rayleigh number from 103 to 106, and the type of nanofluid (Cu and Al2O3) on the flow streamlines, isotherm distribution, and Nusselt number are examined in the simulation. The results indicate that the addition of Cu and Al2O3 nanoparticles increases the mean Nusselt number, which improves heat transfer and significantly alters the flow pattern. Moreover, the mean Nusselt number increases with increasing Rayleigh number and volume fraction, with Cu- Al2O3 hybrid nanofluid producing the best results.

Keywords:*Natural convection, Hybrid nanofluids, Numerical simulation.*

Corresponding author's:h.salhi@univ-batna2.dz
sciencesconf.org:ncmm2023: T11-2023102

COMPARATIVE STUDY OF HILL CLIMBING AND INCREMENTAL CONDUCTANCE MPPT TECHNIQUES FOR PV SYSTEMS

Noussaiba MENNAI 1, Ammar MEDOUED 1, Youcef SOUFI 2

1 Dept. Electrical Engineering , LES Laboratory, University of 20 August 1955, Skikda, Algeria. 2 Dept. Electrical Engineering , LABGET Laboratory, Larbi Tebessi University, Tebessa, Algeria.

Abstract

Photovoltaic (PV) solar energy is expanding more and more into the power system to meet the growing demand. An important aspect of optimizing PV system output lies in the implementation of an efficient maximum power point tracking (MPPT) controller since PV characteristics are non-linear. In this context, this research presents a simulation-based comparative study of Hill Climbing (HC) and Incremental Conductance (INC) MPPT controllers, considering dynamic response and steady-state efficiency. By modeling a 500 kW PV array, along with both MPPT methods, a boost converter, and pulse width modulation (PWM), simulation tests for each technique were conducted in Matlab/Simulink under Standard Test Conditions (STC) and variable meteorological conditions. Simulation results demonstrate that both HC and INC controllers effectively track the maximum power point, with INC outperforming HC in terms of speed, accuracy, and overall efficiency, especially under sudden changes in irradiance and temperature. Additionally, a test exploring the impact of perturbation step size on dynamic response and steady-state efficiency provides insights into optimizing MPPT controller performance.

Keywords:*Photovoltaic (PV) System, Maximum Power Point Tracking (MPPT), Hill Climbing (HC),Incremental Conductance (INC), Perturbation step size..*

Corresponding author's:n.mennai@univ-skikda.dz
sciencesconf.org:ncmm2023: T11-2023103

NUMERICAL ANALYSIS OF THERMAL COMFORT IN VENTILATED ROOMS USING THE LATTICE BOLTZMANN METHOD

Assia ARAB1, Zouhira HIRECHE2, Nabil HIMRANE1, Mourad MAGHERBI3,Yacine HALOUANE1, Djamel Eddine AMEZIANI2

1. Laboratory of Energy and Mechanical Engineering, Faculty of Technology, university M'hamed Bougara of Boumerdes, Algeria. 2. Laboratory of Multiphase Transport and Porous Media , Faculty of Mechanical and Proceeding Engineering, University of Sciences

Abstract

People have a strong need for a high level of comfort, with a specific focus on thermal comfort, which is directly linked to the indoor air temperature. In this study, we employed the Lattice Boltzmann method with a multiple relaxation time (LBM-MRT) to numerically simulate mixed convection heat transfer within a rectangular ventilated room. Air displacement ventilation was implemented through two diagonally opposed openings, while the Darcy-Brinkman-Forchheimer model was used to simulate the porous partition material. Adiabatic conditions were maintained on the other walls, with the right wall exposed to a uniform hot temperature. The mathematical resolution was achieved using the Lattice Boltzmann method with a multiple relaxation time (MRT). Initially, the porous partition had a height of Hp=0.6 and a permeability value of Da=10^(-6). The results were presented in terms of streamlines and isotherms as functions of the different control parameters, Reynolds, and Richardson numbers. We also examined how the height of the porous partition influenced ventilation efficiency.

Keywords:*Lattice Boltzmann method, thermal comfort, heat transfer, ventilated room, porous partition..*

Corresponding author's:as.arab@univ-boumerdes.dz
sciencesconf.org:ncmm2023: T11-2023104

NUMERICAL STUDY OF A DARRIEUS TANDEM WIND TURBINE WITH DOWNSTREAM BLADE DISPLACEMENT

Mahdi GOUCEM1

1Laboratory of Aeronautics and Propulsion Systems, USTO University

Abstract

This study presents a numerical investigation into the performance of a tandem Darrieus wind turbine configuration with downstream displacement. The primary objective is to assess the impact of relative positioning between the upstream and downstream turbines on power extraction and efficiency. Computational fluid dynamics (CFD) simulations are conducted to analyze the flow patterns, velocity distributions, and power generation characteristics under varying displacement distances. The results reveal that optimizing the downstream displacement can lead to significant improvements in power generation for the tandem configuration. By adjusting the spacing between the two turbines, it is possible to mitigate the negative effects of wake interactions and enhance overall system efficiency. The study also identifies the optimal displacement distance that maximizes power output while minimizing aerodynamic losses. These findings have practical implications for the design and deployment of tandem Darrieus wind turbine systems, offering insights into strategies for enhancing their performance in real-world wind conditions. The numerical approach presented here provides a valuable tool for assessing and optimizing the configuration of such turbines, contributing to the advancement of renewable energy solutions.

Keywords:*H-Darrieus turbine, tandem configuration, NACA0015, power coefficient, aerodynamic performance..*

Corresponding author's:mehdi1ene@yahoo.fr
sciencesconf.org:ncmm2023: T11-2023105

CARACTÉRISATION DE LA FRACTION INORGANIQUE DES PARTICULES ATMOSPHÉRIQUES DES ZONES INDUSTRIELLES (BEJAIA)

AIT OUAKLI Nabila1,2*, LEMOU Abdelkader1, CHERIFI Nabila1, LADJI Riad1

1 Unité de Recherche en analyse et développement technologique en environnement UR-ADTE, Centre de Recherche en Analyses physicochimique CRAPC, Bousmail, Algérie,

2 Laboratoire de technologie des matériaux, Université de béjaia, Route de Targua Ouzmmo

Abstract

Nowadays, atmospheric pollution is increasingly better evaluated, unlike particles which remain difficult to quantify precisely, due to the complexity of the parameters characterizing them.As part of this contribution, we were interested in the analysis, characterization and identification of sources of atmospheric particle emissions within the Alphaditex unit (Bejaia). The samples were taken from approximate blocks and rooms using the passive method.Several techniques have been chosen for the physicochemical characterization of these particles, including atomic absorption spectroscopy (AAS), X-ray fluorescence (XRF), X-ray diffraction (XRD) and SEM scanning electron microscopy. The results obtained show that the atmospheric particls analyzed from this hospital belong to natural and anthropogenic sources.

Keywords:*atmospheric particls, quantification, aérosol, modeling , caractérisation.*

Corresponding author's:a_nabila13@yahoo.com
sciencesconf.org:ncmm2023: T11-2023106

STUDY OF THE PERFORMANCE OF A SELF-EXCITED ASYNCHRONOUS GENERATOR FOR AUTONOMOUS WIND POWER GENERATION

Belynda FARES1, Radia ABDELLI 1, Ahcene BOUZIDA2

1Industrial Technology and Information Laboratory LTII, Faculty of Technology, University of Bejaia,06000 Bejaia, Algeria 2Faculty of Sciences and Applied Sciences, University Ali Mohand Oulhadj, 10000 Bouira, Algeria

Abstract

Renewable energies are seen as the solution to the world's energy problem, with green energy sources proving their reliability and benefits over the years. Electricity generation from wind turbines is one of the most promising forms. Wind power systems installed in remote areas use self-excited induction generators, which are an excellent choice for this type of application. These generators are specially designed to operate in remote locations with no access to the power grid. They can harness the power of the wind and convert it into electricity, providing a reliable and sustainable source of energy for these remote areas. In addition, self-excited induction generators are simple and robust in design, making them easy to maintain and repair and even more suitable for isolated installations. In the present work, we will study the performance of a self-excited asynchronous generator in the presence of different types of loads. We will provide a detailed explanation of the self-excitation phenomena, create a generator model using finite elements, and test our findings using simulation.

Keywords:*Self-excitation; Performance; Wind power; Asynchronous generator.*

Corresponding author's:belynda.fares@univ-bejaia.dz
sciencesconf.org:ncmm2023: T11-2023107

PERFORMANCES ASSESSMENT OF AN INTEGRATED SOLAR COMBINED CYCLE SYSTEM POWERED BY GAS TURBINES AND PARABOLIC TROUGH COLLECTORS.

Mouloud AISSANI 1*, Kamal MOHAMMEDI 2,1, Takieddine REDDAH 1, Abdel Halim ZITOUNI1, Lotfi BEGHDADI 1

1. Research Center in Industrial Technologies CRTI P.O.Box 64, Cheraga 16014 Algiers, Algeria 2. Research Unit Materials, Processes and Environment (URMPE), M'Hamed Bougara University of Boumerdès, Algeria.

Abstract

In the last decade, integrated solar combined cycle system (ISCCS) projects have been a promising way and the silver bullet of concentrated solar power (CSP) technologies projects implementation. This concept was developed by Luz Solar International Company in the early 1990s, to integrate parabolic trough concentrators in a combined cycle power plant. The Integrated solar combined cycle system (ISCCS) is technical-economically interesting to overcome the problem of solar energy storage. Its performance is, however, strongly dependent on the intensity of the solar input and the heat transfer fluid (HTF) from solar energy to the combined cycle asset. In order to convert solar thermal energy to electricity, heat recovery steam generator (HRSG) is used downstream of an economizer, to produce high pressure saturated steam which is returned to the HRSG for superheating by the gas turbine exhaust gases. The ISCCS Hassi R'mel SPP1 plant consists of a Siemens steam turbine unit with a maximum capacity of 80 MW and a solar field of 18 Ha. Two gas turbines with natural Gas combustors provide back-up. The steam turbine unit and two heats recovery steam generators with a design stack temperature of 130°C work in parallel with the solar steam generator. In this paper, energy and exergy analyses have been done in order to optimize the whole power plant cycle.

Keywords:*Integrated solar combined cycle system, Steam turbine, concentrated solar power CSP, power plant..*

Corresponding author's:m.aissani@crti.dz
sciencesconf.org:ncmm2023: T11-2023108

MICROBIAL FUEL CELLS MFC FOR ELECTRICAL ENERGY

Mustapha abd el djabar charef1,2 Mostefa kameche 2, Christophe innocent 3

2. Université de science et technologie mohamed bodiaf oran,faculté de physique ,département de physique des matériaux ,laboratoire LPCMCE usto

Abstract

the unsustainable nature and the environmental impact of fossil fuels have shifted attention to renewable energy and fuel cells, especially in the transportation sector. In this study, the generation of electricity based on the electrons released from biochemical reactions facilitated by microbes is evaluated. Microbial fuel cell (MFC) represents an eco-friendly approach to generating electricity while purifying wastewater concurrently, achieving up to 50% chemical oxygen demand removal and power densities in the range of 420–460 mW/m2. The system utilizes the metabolism power of bacteria for electricity generation. This mini-review is quite comprehensive. It is different from other reviews, it is all-inclusive focusing on the; types of MFCs; substrates and microbes; areas of applications; device performances; design, and technology configuration. All these were evaluated, presented and discussed which can now be accessed in a single paper. It was discovered that higher power density and coulombic efficiency could be achieved through proper selection of microbes, mode of operation, a suitable material for construction, and improved MFC types. Also, the full-scale application of MFC is impeded by materialscost and the wastewater low buffering capacity. Though the electricity generated is still at the demonstrationstage, to date, there is no industrial application. Therefore, this study reviewed articles on the technology to set new and insightful perspectives for further research and highlighted steps for scale-up while reinforcing the criteria for microbe selection and their corresponding activity.

Keywords:*Microbial fuel cell , wastewater,microbe selection.*

Corresponding author's:m.charef@univ-chlef.dz
sciencesconf.org:ncmm2023: T11-2023109

AERODYNAMIC CHARACTERISTICS OPTIMISATION OF WIND TURBINE BLADE

Abdelhakim Amine DJENDARA , Mohammed NEBBACHE
Laboratory of aeronautics and propulsive systems

Abstract

The present study aims to predict the aerodynamic coefficients of the S809 airfoil, which is widely used for horizontal axis wind turbines, using the commercial codes Fluent 17.2 and Gambit 2.4.6. Two parameters are taken into account, the influence of the curvature correction and the comparison of the turbulence models. Three turbulence models are used: Spalart-Allmaras, Shear Stress Transport k-ω and Transition SST. The numerical results of the simulation are compared with the experimental results of the 1.8 m × 1.25 m low-turbulence wind tunnel at the Delft University of Technology for a Reynolds number of 106 . The results show that the use of the curvature correction improves the prediction of the aerodynamic coefficients for all the turbulence models used.In further work, the curvature correction is used since it gave better results. For turbulence modeling, the Transition SST model is the one that gives the best results for the lift coefficient, followed by the Shear Stress Transport k-ω model, and finally the Spalart-Allmaras model. For the drag coefficient, Transition SST model is the best, followed by the Spalart-Allmaras model, and finally the Shear Stress Transport k-ω model.

Keywords:*Aerodynamic coefficients, Curvature Correction, Numerical simulation, Turbulence models, Wind turbine..*

Corresponding author's:djendara3188@gmail.com
sciencesconf.org:ncmm2023: T11-2023110

MICROWAVE AS PRETREATMENT METHOD FOR THE REDUCTION OF FFA FROM WASTE VEGETABLE OIL.

Halima Kerras1, Nawel Outili1, Abdesslam Hassen MENIAI Meniai1

Laboratory of environmental engineering processes (LIPE), Saleh Boubnider Constantine3 University. Algeria.

Abstract

Numerous research endeavors in the realm of utilizing vegetable oils and animal fats for biodiesel synthesis have concentrated on enhancing biodiesel output. This has been achieved through pre-treatment methodologies designed to lower the Free Fatty Acid (FFA) content. Literature highlights that the efficacy, both economically and environmentally, of converting cooking oils into biodiesel is contingent upon the pre-treatment phase. Indeed, the presence of Free Fatty Acids (FFA), at a certain level, promotes saponification, leading to a reduction in the efficiency of the transesterification reaction. Several pre-treatment methods, including chemical processes such as esterification and physical methods such as adsorption, have been applied. While effective, these methods come with significant drawbacks they consume substantial amounts of chemicals, water, energy, time, and generate waste. In the present work, microwave waves were applied, for the first time, as an unconventional oil pre-treatment method oils to reduce FFA. The cooking oil was 100% soybean and had an acidity value (AV) of 4.48 mg KOH/g oil. The considered factors for the MW pretreatment were power and time ranging. The results showed that microwaves, when applied under optimum conditions, enable FFA to be reduced in a reasonable time and without the use of products or generation of waste. This process could be used as a pretreatment process for the use of oils rich in free fatty acids in transesterification for biodiesel production.

Keywords:*Waste cooking oil, Free Fatty Acids, Unconventional oil pretreatment method, Microwave, Biodiesel..*

Corresponding author's:halima.kerras@univ-constantine3.dz
sciencesconf.org:ncmm2023: T11-2023111

WIND ENERGY CONVERSION CHAIN MODELING

Karima Chebli, Rachid Lalalou
Electrotechnical Laboratory of Skiksa ELS, Skikda University

Abstract

The wind turbines are equipped with a control system based on electronic converters to adapt to wind conditions. The wind system is controlled in such a way as to maximize the power produced by constantly looking for the operating point at maximum power. In this paper, we will focus on the modeling of the wind conversion chain based on MADA, analytical models of the different mechanical components of the wind system have been established. Park's transformation was used to model the generator. Next, the inverter was modeled; This allowed us to obtain the curves of variation of the electrical and mechanical parameters for the different operating regimes of the MADA.

Keywords:*Wind turbine, DFIG, Co.*

Corresponding author's:karimachebli95@gmail.com
sciencesconf.org:ncmm2023: T11-2023112

THE IMPORTANCE OF PASSIVE ENERGY EFFICIENCY TECHNIQUES IN REDUCING THE ENERGY CONSUMPTION OF BUILDINGS LOCATED IN A MEDITERRANEAN CLIMATE

Amel LIMAM 1, Lotfi DERRADJI 1 . 2, Abdelouahab BOUTTOUT 1

1 National Center of Building Integrated Research and Studies (CNERIB), Algiers, Algeria.
2 Université Saad Dahlab, Blida, Department of Mechanical Engineering, BP. 270 Route de Soumaa, Blida 9000, Algeria

Abstract

One of main research directions in the construction field is the reduction of the energy consumption, which supposes materials, technology and conception of buildings. The existing buildings in Algeria are inadequate and energy-intensive. As these dwellings have not been subject to any thermal or energy regulatory requirements at the time of their construction, it is therefore necessary to reduce their energy consumption and environmental impact by promoting the concept of thermal rehabilitation in order to control energy consumption. The main objective of this work is to compare an analytical calculation and a dynamic thermal simulation under TRNSYS of the energy needs of a dwelling located in the climatic zone "A" before and after thermal rehabilitation using passive energy efficiency techniques. The methods carried out in this work consists in studying the effect of the thermal insulation of the envelope, the types of windows and glazing of an existing dwelling on the energy consumption. The results showed a significant reduction in energy needs after thermal rehabilitation which also reduces greenhouse gases.

Keywords:*Thermal rehabilitation, energy consumption, dynamic thermal simulation, thermal insulation, windows.*

Corresponding author's:limammaha@yahoo.fr
sciencesconf.org:ncmm2023: T11-2023114

A COMPREHENSIVE STUDY ON WIND TURBINE FAULTS AND DIAGNOSIS METHODS

Abderrahmane LAKIKZA1, Hocine CHEGHIB1

1 Electrotechnical system laboratory, Badji Mokhtar-Annaba University

Abstract

Wind energy is one of the most important sources of clean energy, although its manufacturing and system maintenance costs are significant. In this research, we present a comprehensive study of wind turbine components, their sensitivity within the system, as well as the most critical diagnostic methods and methodologies for extracting fault features, aiming to achieve proactive system maintenance and minimise losses.

Keywords:*Wind turbine fault, Diagnosis methods, Artificial intelligence, Signal processing.*

Corresponding author's:lakikzaskiiiikda@gmail.com
sciencesconf.org:ncmm2023: T11-2023115

STUDY OF THE EFFECT OF BUBBLE DIAMETER ON THE EFFICIENCY OF TWO-PHASE FLOW CENTRIFUGAL PUMPS

Bessam TOUMI1, Abdelmadjid ATIF2

1. LMESC-Dpt of Energetics – Faculty of Mechanical and process Engineering/USTHB – 2. LMESC-Dpt of Energetics – Faculty of Mechanical and process Engineering/USTHB

Abstract

Centrifugal pumps are highly efficient in transporting single-phase fluids. However, the efficiency of this type of pump is adversely affected by two-phase flows, where the accumulation of the gaseous phase significantly deteriorates the performance of centrifugal pumps. Numerous research studies have been conducted to understand the effect of two-phase flows on the performance of these pumps. Many of these studies are based on the Euler–Euler Two-Fluid model, where a liquid is considered the continuous phase and gas is the non-continuous phase (dispersed phase), with gas bubbles assumed to have a constant diameter. This work aims to study the effect of the diameter of gas bubbles on the efficiency of centrifugal pumps and the credibility of using this type of pump in analyzing the behavior of two-phase centrifugal pumps

Keywords:*Two-phase flows - Gas accumulation - Centrifugal pump - Euler–Euler Two Fluid model - Bubble Diameter.*

Corresponding author's:toumibessam18@gmail.com
sciencesconf.org:ncmm2023: T11-2023116

NANOTECHNOLOGY AND ENERGY

Abdelaziz Merghadi1, Loubna Hamdi1

1 Water and Environment laboratory, Echikh Larbi Tebessi University, Tebessa, Algeria.

Abstract

Nanotechnology is generating a lot of attention these days and therefore building great expectations not only in the academic community but also among investors, the governments, and industry. Its unique capability to fabricate new structures at atomic scale has already produced novel materials and devices with great potential applications in a wide number of fields. Among them, significant breakthroughs are especially required in the energy sector that will allow us to maintain our increasing appetite for energy, which increases both with the number of people that join the developed economies and with our demand per capita. This needs to be done in a way that includes the environment in the wealth production equation as we gather more evidences of the human impact on the climate, biodiversity and quality of the air, water and soil.

This research does not cover in detail all the specific contributions from nanotechnology to the various sustainable energies, but in a broader way, it collects the most recent advances of nanotechnology to sustainable energy production, storage and use. For this review paper, solar, hydrogen and new generation batteries and super capacitors are described as the most significant examples of the contributions of nanotechnology in the energy sector. Therefore, to present some significant contributions from many research groups who are mainly unconnected and are working from different viewpoints, to find solutions to one of the great challenges of our time, i.e., the production and use of energy, without compromising our environment, from one of the most exciting and multidisciplinary fields, nanotechnology.

Keywords:*Energy, Nanotechnology, Technology, Environment, Batteries..*

Corresponding author's:abdelaziz.merghadi@gmail.com
sciencesconf.org:ncmm2023: T11-2023117

FENE- Dumbbell Model of Surfactants solutions in Microchannel

Hassiba Bahloul 1 , Ahmed OUIBRAHIM2

1 Laboratoire d'Energétique Mécanique et Matériaux - LEMM, Université de Tizi-Ouzou, Algeria. 2 Département de Génie Mécanique, Faculté de Technologie, Université de Boumerdès, Algeria.

Abstract

Microfluidics is a phenomenon that dates 20 years back, gives rise to a great interest for several domains .In our case we are interested by the flow in microchannels of aqueous solutions of surfactant, well known as corrosion inhibitor and hydrodynamic drag reducer such as polymer solutions. Compared to polymer solutions, they are less sensitive to mechanical degradation.The FENE- dumbbell model is here considered to represent these surfactant aqueous solutions. The corresponding equations to describe the dynamic of such a flow (equations of motion together with the FENE- dumbbell model constitutive equations) are handled analytically. Owing to their complexity, we first proceed to a phenomenological analysis of these equations in order to determine the characteristic parameters (confinement, Deborah and Reynolds numbers….) and then, we can find analytical solutions by taking into account the confinement and distinguished situations, weak flow and strong flow situations. This analytical solutions are very different in macroscopic–scale. Using the commercial Finite Volume software Fluent 6.3 together with an appropriate developed computational code, via UDF (User Defined functions) were applied to define the flow hydraudynamic characteristics parameters as well as pressure and velocity field and the rheological proprieties like stress field, and shear viscosity.

Keywords:*Confinement, FENE-dumbell model, Deborah number, microfluidic, non- Newtonian fluids polymer solution, surfactant, weak flow, UDF, hydraudynamic characteristics parameters..*

Corresponding author's:bahloulhassiba@yahoo.fr
sciencesconf.org:ncmm2023: T11-2023118

FIRST-PRINCIPLES STUDY OF CUBIC CS-BASED PERVSKITES CSGEX3 (X=BR, CL AND F)

Somia MERAH1 , Omar Sahnoun1 , Howaria Riane1

1Department of physics / Research Institute LPQ3M University of Mascara, Algeria

Abstract

The structural and electronic properties of cubic Cs-based perovskites CsGeX3 (X=Br, Cl and F) have been calculated by using the first-principles density function theory (DFT) as implemented in the WIEN2K code [1]. The FP-LAPW method within the (GGA) [2] and (mBJ) [3] approximations are chosen in the computational approach. The perovskite CsGeX3 (X=Br, Cl and F) crystallize in cubic structure with space group Pm-3m N° 221. These compounds are semiconductors with a direct gap (R-R) varying between 1.0 and 2.2 eV calculated by GGA, 1.4 and 3.6 eV by mBJ. The electronic properties are determined mainly by Cs-X bonding which, in turn, depends on Ge-X bonding. Our results: optimized lattice parameters, bulk modulus, band structures, as well as densities of states are in good agreement with the available theoretical data that previously reported in the literature. Our investigation suggests that the CsGeX3 or their modified versions are very good candidate for optoelectronic devices.

Keywords:*Ab-initio, First-principles, Perovskites, DFT.*

Corresponding author's:soumia.merah@univ-mascara.dz
sciencesconf.org:ncmm2023: T11-2023119

MORPHOLOGICAL CHARACTERIZATION OF SB-DOPED SNO2 THIN FILMS: DOPING EFFECT

Halima HABIEB, Nasr-Eddine HAMDADOU

Micro and Nanophysics Laboratory « LaMiN », National Polytechnic School of Oran Maurice Audin « ENPO MA », BP 1523 El Mnaouer, Oran 31000, Algeria

Abstract

In the present work, we have successfully deposited Sb antimony doped tin dioxide (SnO2) thin films with different concentrations (0 at% and 1 at%) from a stannous (II) chloride dihydrate solution (SnCl2.2H2O), by the pyrolysis chemical spray deposition technique on microscope glass substrates preheated to a fixed temperature of 350 °C. After deposition, the films were annealed at temperatures 400 °C for 4h. The aim of this work is on the one hand to study the morphological properties of pure and doped tin dioxide thin films and to determine the different morphological parameters such as: the roughness Ra, Rq and on the other hand to study the effect of Sb doping on the morphological properties of SnO2 thin films. To achieve this purpose, the thickness of all the films was estimated by profilometer with standard scan type. The structural properties have been investigated using grazing incidence X-ray diffraction (GIXRD). The morphology of the films was examined by atomic force microscope (AFM) in taping mode at room temperature to visualize the surface of our samples (the structure, size and morphology of crystallites ... etc). GIXRD diagrams show that the films deposited before and after doping are polycrystalline with a tetragonal rutile type structure and preferred orientation direction along [110]. It has been also noted that the grain size changes between 22 nm and 24 nm. The 2D and 3D AFM images confirm the formation of nanostructures on the surface, with shapes and dimensions influenced by the amount of antimony doping. All the samples show a polycrystalline morphology, and the grain size progressively decreases with the increase of the Sb concentration. We noticed that the roughness increased after doping, and the root mean square (RMS) surface roughness values for samples with Sb concentrations (1%) were found to be 7.704 nm.

Keywords:*Thin films, SnO2 tin dioxide, Spray Pyrolysis, Grazing Incidence X-ray Diffraction (GIXRD), AFM atomic force microscopy, Annealing temperature*..

Corresponding author's:habieb.halima@gmail.com
sciencesconf.org:ncmm2023: T11-2023120

RENEWABLE ENERGY TECHNOLOGIES

Loubna Hamdi1, Abdelaziz Merghadi1
Water and Environment Laboratory , Echahid Chikh Larbi Tebessi, Tebessa, Algeria

Abstract

Renewable Energy Sources (RES), used to produce energy from natural processes, are nowadays used to meet the ever-increasing energy requirements worldwide, replacing conventional energy sources. Conventional energy sources are finite and under depletion. On contrary, renewable energy sources are constantly appearing in the natural environment. The main forms of RES are solar energy, wind energy, hydroelectric energy, geothermal energy and biomass. Many countries around the world have adopted the application of RES in order to become energy independent. However, the acceptance or the rejection of RES by citizens has an important role, as no new technology related to them can be effectively implemented without the social acceptance.RES can meet many times the present world energy demand, so their potential is enormous. They can enhance diversity in energy supply markets, secure long-term sustainable energy supplies, and reduce local and global atmospheric emissions. They can also provide commercially attractive options to meet specific needs for energy services (particularly in developing countries and rural areas), create new employment opportunities, and offer possibilities for local manufacturing of equipmentThere are many renewable technologies. Although often commercially available, most are still at an early stage of development and not technically mature. They demand continuing research, development, and demonstration efforts. In addition, few renewable energy technologies can compete with conventional fuels on cost, except in some niche markets. But substantial cost reductions can be achieved for most renewables, closing gaps and making them more competitive. That will require further technology development and market deployment—and boosting production capacities to mass production.

Keywords:*Renewable energy, Emissions, Technology, Environment, Development..*

Corresponding author's:loubna.hammdi@gmail.com
sciencesconf.org:ncmm2023: T11-2023121

PERFORMANCE DEGRADATION OF A PHOTOVOLTAIC PANEL with aging

Radhia DOUMANE1, Amina ENNEMRI2

Laboratoire Energétique, Mécanique et Ingénieries, M'hamed Bougara Université deBoumerdes

Abstract

The performance of photovoltaic modules can be degraded due to several factors, including temperature, humidity, irradiation, dust, and mechanical shocks. This degradation leads to a progressive damage in the characteristics of a component or system, which can alter its ability to operate within the limits of acceptability criteria and is caused by service conditions. The degraded state of the photovoltaic module can become problematic when the degradation exceeds a critical threshold. Photovoltaic module manufacturers consider a module to be degraded when its power reaches a level lower than 80% of its initial value. During the lifetime of the module assessed to 20-25 years, the model specifies that the relative efficiency undergoes a loss of 13.35%. This decline in performance is mainly due to the transmittance deterioration which has a share of 86.5% on this loss. Much smaller rundowns are supplied by the series resistance and the parallel one, respectively with proportions of 2.5% and 11%, both caused by the alteration of the electrical properties of the PN junction and of the electrodes.

Keywords:*Photovoltaique module, performance, aging.*

Corresponding author's:doumane.radia@gmail.com
sciencesconf.org:ncmm2023: T11-2023122

SOLAR ABSORPTION HEAT STORAGE SYSTEM

1 ALIOUAT KHADRA , 2 CHERRAD NOUREDDINE
Laboratoire de Mécanique Appliquée et Systèmes Energétiques

Abstract

This paper presents a simulation of an solar energy absorption system operating with a lithium bromide working pair using the Aspen Plus program. The aim of this research is to present a method for evaluating the characteristics and performance of an absorption machine and storage solar energy . The obtained results showed that the performance of the proposed system improves by increasing the operating temperatures of the generator, and the results also showed that the best coefficient is achieved by decreasing the absorption and condensation temperatures

Keywords:*absorption system,solar ,lithium bromide*.

Corresponding author's:djahidaaliouat17@gmail.com
sciencesconf.org:ncmm2023: T11-2023123

THERMAL ANALYSIS OF LIQUID-SENSIBLE HEAT STORAGE UNITS FOR LOW-TEMPERATURE SOLAR APPLICATIONS

Abdenour BOURABA, Amel B BOUKADOUM, Sofiane EL MOkRETAR, Hakim SEMAI, Aissa AMARI

Centre de Développement des Energies Renouvelables, Bouzaréah, Algiers, Algeria

Abstract

The main limiting factor of solar applications is that it is a cyclical and time-dependent energy source. Therefore, solar energy systems requires energy storage to ensure their operation during nighttime and cloudy weather. This paper proposes two configurations of liquid-sensible heat storage unit for low-temperature solar applications. In the first configuration, which is an air-based system, the storage element is water, while the hot and cold heat transfer fluids are air. In the second one, which is a water-based system, the storage element is thermal oil, while the hot and cold heat transfer fluids are water. Concerning the second configuration, sunflower and engine oils have been tested to store the heat. The inlet temperatures of hot heat transfer fluids have been measured experimentally using air and water flat-plate solar collectors. The duration of the complete charge-discharge cycle has been calculated for each storage element. Besides, the temperature of storage element, the outlet temperature of the energy storage system and the amount of heat stored during a day of storage have been examined. During the storage process, it is found that the temperature of the liquid bath and the temperature of the heat transfer fluid leaving the system gradually increase. In addition, the effect of variation in the volume (mass) of the storage element on the storage element temperature, the amount of heat stored, and the temperature of the heat transfer fluid exiting the system was investigated.

Keywords:*Energy conversion, liquid media sensible heat storage, sensible heat storage, Solar energy, storage material.*

Corresponding author's:abdenourbourabaa@yahoo.fr
sciencesconf.org:ncmm2023: T11-2023124

ANALYZING THE INFLUENCE OF PARTIAL SHADING ON PHOTOVOLTAIC SYSTEM PERFORMANCE

Marah Bacha* 1, Amel Terki 1, Rabiaa Houili 2 , Madjda Bacha 3, Imad Youcef 3

[1]Laboratory of Electrical Engineering of Biskra (LGEB), University of Biskra, Algeria
[2]Laboratory of Modeling of Energy Systems (LMSE), University of Biskra, Algeria [3]Laboratory of Metallic and Semiconducting Materials (LMSM), University of Biskra, Alger

Abstract

The growing demand for renewable energy has led to the widespread adoption of solar photovoltaic (PV) systems. However, PV systems are susceptible to various faults and operating conditions, which can impact their reliability and efficiency, among them the shading fault which is caused by leaves, soil, trees, poles and building or tough to expect due to clouds, and snow etc. The principal focus of this study is to thoroughly investigate and clarify the ramifications of partial shading specifically on the current-voltage (I-V) and power-voltage (P-V) traits inherent to a photovoltaic panel. This inquiry is rigorously pursued via simulation techniques employing MATLAB/Simulink. The discernments derived from this research unveil substantial disparities in operational efficacy between scenarios involving shading and those without, showcased comprehensively through graphical representations encapsulating all study outcomes.

Keywords:*Partial Shading; PV Fault; Photovoltaic Systems, Modeling and Simulation, Current-Voltage Curves..*

Corresponding author's:marah.bacha@univ-biskra.dz
sciencesconf.org:ncmm2023: T11-2023125

MULTICRITERIA DECISION SYSTEMS FOR SMALL SCALE DESALINATION UNIT POWERED BY HYBRID SYSTEMS

Samira AMARACHE1, Kamal MOHAMMEDI1

1 Research Unit:Materials, Processes and Environment (UR/MPE), Boumerdes University

Abstract

Simultaneous Electricity production and water desalination with renewable energy are great issues when it comes to consider sustainable development goals application in remote arid areas. Use of hybrid PV-Wind-Diesel systems to produce water and energy is largely justified on all levels: technical feasibility, economic viability and above the obvious social and environmental benefits offered by this alternative, especially for rough and isolated sites. However, the optimal planning of rural hybrid systems is a challenging and complex task, especially when different alternatives and sustainability aspects are considered. This paper develops an integrated decision-making approach for the optimal planning of renewable energy supply system comprising solar, wind sources- RO unit. Economically, the specific cost of energy and the annual cost of the installation are more important in a conventional system (diesel only) than in the hybrid system. On the other hand, the use of such installation is strongly linked to the available potential of renewable energy, which justifies the presence of Diesel genset in all possible configurations. This means that Renewable energy alone does not guarantee the satisfaction of demand at any time of year, especially for autonomous systems. We present a PV-Wind-Diesel hybrid renewable energy system case study for electricity production including a reverse osmose desalination unit.

Keywords:*multicriteria decision, hybrid system, reverse osmosis, homer.*

Corresponding author's:s.amarache@univ-boumerdes.DZ
sciencesconf.org:ncmm2023: T11-2023126

EXPLORING NI-P, CO-NI, AND CO-NI-P CATALYSTS FOR ENHANCED HYDROGEN EVOLUTION REACTION IN SUSTAINABLE ENERGY APPLICATIONS.

Nada BOUMAZZA, Wissem BOUGHOUICHE, Imene ABID, Yazid MESSAOUDI and Amor AZIZI

Laboratoire de Chimie, Ingénierie Moléculaire et Nanostructures, département de chimie, Faculté de science, Université Ferhat Abbas Sétif 1, Sétif 19000, Algeria.

Abstract

Fossil fuels, despite their undeniable role in powering human progress, present a host of environmental, economic, and social challenges. The combustion of fossil fuels releases vast amounts of greenhouse gases, contributing significantly to climate change and global warming. Thus, hydrogen fuel is emerged as the most sustainable and a versatile energy carrier to replace fossil fuels. For that, hydrogen can be produced through various methods, such as Steam methane reforming and water splitting however, the first one has drawback which it emits CO2. Therefore, the demand for designing electrocatalytsts with a high surface area and facilities electron transfers are crucial for Hydrogen evolution reaction (HER). In this work, three metal phosphide-based Ni-P, Co-Ni and Co-Ni-P were investigate as electrode to produce hydrogen via water splitting. The three electrodes were synthesis by electrochemical deposition at different current density. The evaluation of the performance of the as-prepared electrodes for hydrogen evolution reaction (HER) was analyzed through polarization curves, Tafel slope, and electrochemical impedance spectroscopy (EIS). As a result, the polarization curve indicates an improvement in HER performance with increasing current deposition, accompanied by small Tafel slope values. In addition, the EIS analysis showed that as the current deposition increased, a corresponding enhancement in the HER efficiency was observed, underscored by minimal resistance of charge transfer (Rct) values and small semi-circle. Also the comparization of these three electrodes reveals that the Co-Ni-P and Co-Ni exhibits a better performance than Ni-P. This research contributes valuable findings to the development of efficient and sustainable electrodes for advancing water splitting technologies in the pursuit of clean hydrogen energy. It also offers insights into optimizing their structure and composition for enhanced electrocatalytic performance, marking a significant step toward advancing hydrogen production technologies.

Keywords:*Hydrogen evolution reaction, Renewable energy, Polarization curve, Water splitting.*

Corresponding author's:nadaboumazza@gmail.com
sciencesconf.org:ncmm2023: T11-2023127

COMPARATIVE ANALYSIS OF SUPERCRITICAL CO2 AND AIR FLOW IN A CENTRIFUGAL COMPRESSOR

Mohandi Samy 1 , Faiza Brahimi 2 , Boukaraoun Racha 3 , Messaouda Guemmadi 4

1 Dynamique des Moteurs et Vibro-acoustique Laboratory, M'hamed Bougara/Boumerdes University, Algeria. 2 Laboratoire d'Energétique Mécanique et Matériaux, University of Tizi-Ouzou, Tizi-Ouzou, Algeria

Abstract

The compression of supercritical gas flows is essential in various industrial applications, with supercritical carbon dioxide (CO2) at the forefront for its environmental benefits. This work concerns the modeling and numerical simulation of supercritical CO2 flow in a centrifugal compressor, followed by a comparison with air flow.The aim of this study is to understand the behavior of supercritical CO2 in a centrifugal compressor, taking into account the complex thermodynamic properties and transport phenomena specific to supercritical conditions. Numerical simulation of this complex flow using ANSYS provided detailed results. The results were compared with those of the air flow simulation, providing an essential basis for comparison. This comparison highlighted significant differences in the behavior of the two fluids, supercritical CO2 and air, and in the energy performance of the compressor. ,Key parameters such as pressure, temperature, flow velocity and compressor efficiency were analyzed for both fluids.This study is crucial to ensure reliable and efficient performance of centrifugal compressors in applications involving supercritical CO2 . The results provide valuable information to guide the design and operation of supercritical CO2 compression systems.

Keywords:*CFD , centrifugal compressor , CO2 supercritical , energy performance ..*

Corresponding author's:s.mohandi@univ-boumerdes.dz
sciencesconf.org:ncmm2023: T11-2023128

A COMPARATIVE STUDY OF CONVENTIONAL MPPT TECHNIQUE P&O AND FUZZY LOGIC COLNTROLLER IN PHOTOVOLTAIC SYSTEM UNDER VARIABLE CONDITIONS

Lamia HESSAS, Said GROUNI, Sid Ahmed TADJER

Electrification Research Laboratory of industrial companies, Boumerdes,

Abstract

In today's time the user of photovoltaic energy showed strong growth worldwide.the majority of photovoltaic instalation are made up of the same parts : PV array,boost or buck converter ,inverter,grid ,but each installation has its own parameters and specific control mode .the MPPT control have a crucial role, to fixe the maximum power at single point because the PV system has no lineair I-V characteristic in optimizing the perfarmances and efficiency of photovoltaic system. This work presented a simulation of PV array controlled by P&O technique and fuzzy logic control to track the maximum power of PV array and provides them to the load using boost converter under matlab/simulink under constant and variables external conditions, the MPPT performaces of two techniques are analysed and compared, finally the reliability and validity of the PV array using FLC methode provide a higher efficacy of MPPT.

Keywords:*Photovoltaic System, MPPT Control, Fuzzy Logic Controller ,Perturb and Observe , Matlab/Simulink..*

Corresponding author's:l.hessas@univ-boumerdes.dz
sciencesconf.org:ncmm2023: T11-2023129

COMPREHENSIVE NUMERICAL ANALYSIS OF AERODYNAMIC PERFORMANCE IN ASYMMETRIC PROFILES AND INFLUENTIAL FACTORS

Racha BOUKARAOUN 1,2, Faiza BRAHIMI 1,2, Samy MOHANDI 1,2 , Messaouda GUEMMADI 1,3

1 Department of Mechanical Engineering, Faculty of Technology, M'Hamed Bougara University of Boumerdes, Algeria. 2 Dynamic Motors and Vibroacoustics Laboratory, M'Hamed Bougara University of Boumerdes, Algeria. 3 Laboratory of Mechanical Energy and Materi

Abstract

In the field of aerodynamics, the study of asymmetric profiles, such as those used in aircraft wings and turbine blades, is of paramount importance for enhancing performance and energy efficiency. In this context, the present study focuses on a detailed comparison of different turbulence models, including k-ω SST, k-ω, k-ε, and Spalart-Allmaras, through advanced numerical simulations conducted using ANSYS software. The aim is to ascertain their efficacy in predicting aerodynamic stall, as well as in visualizing pressure and velocity fields around the profiles. Exploring various configurations, especially by varying angles of attack and Reynolds numbers, the study seeks to understand how these models perform under diverse operational conditions. This approach is essential in identifying the most appropriate model for accurately predicting critical phenomena and for a detailed analysis of aerodynamic dynamics. Additionally, a comparison of the study's findings with experimental results was carried out. The conclusions drawn from this analysis provide valuable insights for the development of more advanced and efficient aerodynamic technologies. They also underscore the importance of carefully selecting turbulence models that are best suited to the specific requirements of each application.

Keywords:*Aerodynamic performance, Asymmetric profile, CFD, Turbulence Modeling, Stall,Airflow..*

Corresponding author's:r.boukaraoun@univ-boumerdes.dz
sciencesconf.org:ncmm2023: T11-2023130

NUMERICAL INVESTIGATION OF ENHANCING TENGENTIAL FAN PERFORMANCE

F.Z.Mecheri1, M.Ait chikh1, R.Ahmed2, T.Mohamed2, S.Khelladi3, I.Belaidi1

1 LEMI, Faculty of Technology, University M'Hamed Bougara of Boumerdes, Boumerdes 35000, Algeria 2 Mechanical engineering department, University M'Hamed Bougara of Boumerdes, Boumerdes 35000, Algeria 3 Arts et Metiers Institute of Technology, CNAM, LIFSE,

Abstract

Cross-flow fan performance is a crucial aspect of engineering design and has become a hot topic for researchers to investigate. Our study will build upon a previous article authored by Junichiro Fukutomi and Rei Nakamura. In our research, we conducted a numerical investigation utilizing commercial software to predict the aerodynamic performance of a tangential fan, employing the K-epsilon turbulent model. The results obtained are in form of pressure distribution, velocity distribution, flow rate, streamlines, and efficiency analysis

Keywords:*Cross flow fan, ANSYS Fluent, aerodynamic performance*.

Corresponding author's:mecherifatima648@gmail.com
sciencesconf.org:ncmm2023: T11-2023150

MODELING AND OPTIMIZING BATTERY REVENUES IN ELECTRICITY MARKETS

Chahrazad ADICHE

Operational Research and Decision Mathematics Laboratory, USTHB, Algeria.

Abstract

Batteries play a crucial role in the efficient integration of renewable energies. Renewable energy sources, such as solar and wind power, are intermittent and weather-dependent. Batteries can store the energy produced during periods of overproduction, and release it when demand is high, or when renewable energy sources are not very active. By maximizing revenues from batteries, electricity market players encourage greater use of renewable energies, reduce dependence on fossil fuels, and contribute to the transition to a more sustainable, low-carbon energy system. The active participation of batteries in electricity markets also contributes to the stability and reliability of the power grid, avoiding problems such as overloads or blackouts. It has the further advantage of reducing the high cost of setting up additional infrastructure to manage these variations. This paper proposes the integration of a sophisticated economic model and advanced optimization techniques, in order to develop efficient management strategies for energy storage batteries. This enables players to estimate the potential revenues generated by the participation of their batteries in electricity markets.

Keywords:*Battery Energy Storage Systems 1, Renewable Energy Sources 2, Combinatorial Optimization 3.*

Corresponding author's:c.adiche@univ-boumerdes.dz
sciencesconf.org:ncmm2023: T11-2023162

CONTROL OF A PHOTOVOLTAIC SYSTEM CONNECTED TO POWER GRID USING DIRECT POWER CONTROL (DPC)

Farid BELOUAHCHI, Mohamed NASRI

(1)Materials physics laboratory, radiation and nanostructure, University Mohamed El Bachir El Ibrahimi of Bordj Bou Arreridj, Algeria. (2)LAJ, Faculty of Science and Technology, University of Jijel, Ouled Aissa, Jijel, Algeria.

Abstract

In this paper, we present a new control method entitled direct power control of a grid connected photovoltaic (PV) system on two stage converters, where a DC-DC converter is connected between the PV array and the DC-AC converter. The DC-DC converter performs the maximum power point tracking (MPPT) and the voltage amplification. The incremental conductance method is used as a boost converter controller in order to allow the PV array to operate at maximum power for any weather conditions. The DC-AC converter transfers the maximum power extracted from the PV array into the grid. The DPC is a control strategy used to directly manipulate and control the reactive and active power output of a system. In this technique the switches states of inverter are selected from a table of switching based on the immediate errors between the active and reactive powers and their reference values. The modeling and the control are carried out using MATLAB/ Simulink environment. The simulation results are presented with the validation of grid connected PV system performance and the chosen control schemes.

Keywords:*Power directe control (DPC), Grid connected photovoltaic system, The incremental conductance method..*

Corresponding author's:farid.belouahchi@gmail.com
sciencesconf.org:ncmm2023: T11-2023170

NUMERICAL SIMULATION CONTRIBUTES TO THE THERMO-HYDRAULIC STUDY OF A HEAT EXCHANGER WITH HELICAL BAFFLES

Mohamed BENELHAOUES1, Bessam TOUMI2, Mahdia YOUSFI3

1 LTPMP-Dpt of Energetics – Faculty of Mechanical and process Engineering/USTHB, Algiers, Algeria 2 LMESC-Dpt of Energetics – Faculty of Mechanical and process Engineering/USTHB, Algiers, Algeria 3Department of Mechanics-20 Aout 1955 University, Skikda, A

Abstract

This present work is a contribution to the study of the thermo-hydraulic performance of a tube-and-shell heat exchanger equipped with disc quadrant baffles arranged in a pseudo-helical manner, studied in comparison with a conventional tube-and-shell heat exchanger, i.e., equipped with straight baffles. A numerical simulation was carried out using Fluent from Ansys R19.2 Student version for three types of exchangers: two helical ones with quadrant inclinations of 15° and 25°, and another with segmental baffles. Various aspects of the flow were investigated, including the overall heat transfer coefficient and pressure drop, such as streamlines, velocity field, and temperatures. The analysis of the results revealed that, in addition to straight baffles, the disc quadrants effectively induce a helical flow, eliminating undesired recirculation zones that appear with the former. In terms of thermo-hydraulic performance, it was found that the helical baffles with a 25° inclination were the most efficient among the three types considered. Although the 15° inclination resulted in more efficient heat transfer by creating more turbulence, it came at the expense of pressure drop. For the segmental baffle case, the dead zones (rare in fluid) appearing after each straight baffle caused less competitive heat exchange compared to the other two cases.

Keywords:*Tube-and-shell heat exchanger – Segmental baffles – Helical baffles – Inclination angle - Overall thermal exchange coefficient – Pressure drop..*

Corresponding author's:mbenelhaoues@usthb.dz
sciencesconf.org:ncmm2023: T11-2023179

ANALYSIS OF THERMODYNAMICS AND ENVIRONMENTAL IMPACT OF DIFFERENT COMBINED CYCLE CONFIGURATIONS FOR GAS TURBINE APPLICATIONS

Faiza Brahimi, Moussa Mazari, Messaouda Guemmadi
University of Boumerdes

Abstract

The objective of this study is to identify the combined cycle that contributes the most to improving the performance of the simple gas turbine cycle and reducing CO2 emissions through the recovery of exhaust gases. In this work wo different combined cycles were analyzed: Joule-Brayton cycle combined with air bottoming cycle and Joule-Brayton cycle combined with inverted Brayton cycle. The aim is to evaluate the benefits of the best combined cycle based on energy performance and environmental impact. The energy analysis shows a significant improvement in energy efficiency compared to that of the cycle without recovery. The analysis considers key parameters to understand the behavior and integration of these technologies. Furthermore, the amount of CO2 emissions can be substantially reduced, contributing to environmental sustainability in power generation.

Keywords://.

Corresponding author's:brahimifaiza70@yahoo.fr
sciencesconf.org:ncmm2023: T11-2023215

SYMMETRY BREAKING IN ONE DIMENSIONAL BIN-PACKING PROBLEM

Ali Djebid, Brahim Oukacha.

Operational Research and Decision Mathematics Laboratory, Faculty of Sciences, University Mouloud Mammeri of Tizi-Ouzou, 15 000 Tizi Ouzou,Algeria.

Abstract

The one-dimensional bin-packing problem is a highly symmetrical problem, which considerably increases the difficulty of finding an optimal solution with exact solution algorithms. Intuitively, exploiting these symmetries allows fewer nodes in the search tree to be visited, thereby reducing the computation time and memory space of the solution methods. One technique for breaking symmetries is to (a) detect the symmetry either algorithmically or because of some mathematical properties. (b) Reformulating the mathematical program so that certain symmetrical solutions are infeasible (c) Solve the reformulated problem. This paper studies exploiting symmetries in the one-dimensional bin-packing problem by modeling it as a linear integer program. We also show that there exists a subgroup of the symmetry group of this problem to which we associate a set of symmetry-breaking constraints, which allows us to reformulate the linear program as an integer. To illustrate these theoretical results, we give a few examples.

Keywords://.

Corresponding author's:ali.djebid@ummto.dz
sciencesconf.org:ncmm2023: T11-2023216

COMPARATIVE STUDY BETWEEN TWO APPROCHES CFD AND BEM TO INVESTIGATE THE WIND TURBINE PERFORMANCE

Roudoane laouar, Rouigui imen, Mdouki ramzi, Mekahlia alla edine
Echahid cheikh Larbi Tebessi University

Abstract

the current study focused on the design and analyses the performance of micro-horizontal axis wind turbine blade based on comparison between two approaches. Moreover, has been used the blade- element- momentum theory (BEM), for design and evaluated blade performance based on the open source (Qblade) software after choosing the optimal tip speed ratio of TSR-3.5 in lower Reynolds number, Re-10, for NACA4412 airfoil profile, the CFD analyses based on the RANS equations has been used to investigate and gives 3D flow characteristics, pressure field between the upper and lower surface of blade and performance for the turbine blade with higher accurate. the difference results between two approaches are estimated approximately 10%. additionally, when using BEM with all corrections can be gives realistic condition during operation for wind turbine.

Keywords://.

Corresponding author's:riyadh.bekkai@univ-tebessa.dz
sciencesconf.org:ncmm2023: T11-2023241

EXPERIMENTAL ANALYSIS OF A LOW-GRADE HEAT DRIVEN EJECTOR REFRIGERATION INSTALLATION

Ahmed Hadiouche; Malek Hamzaoui; Hakim Nesreddine; Arezki Smaili
University Mouloud MAMMERI of Tizi-Ouzou

Abstract

In this work, an ejection refrigeration installation thermally activated by a low temperature heat source (70°C-90°C), which could be from a solar source, has been studied experimentally. Indeed, the tests cover a range of primary mass flow of R245fa going from 0.50 to 0.66 kg/s with a cooling power of 35kW at the evaporator, whose temperature is varied between 10°C to 20°C and the cooling sink temperature from 20°C to 27°C. To study the behavior of the installation, a parametric analysis was presented, showing the influence of certain parameters on the operation of the installation; namely operational parameters, such as evaporation and condensation temperatures.

Keywords://.

Corresponding author's:ahmed.hadiouche@yahoo.fr
sciencesconf.org:ncmm2023: T11-2023253

STUDY OF THE THERMAL BEHAVIOR OF A WALL CONTAINING TEXTILE INSULATION INCORPORATING PHASE CHANGE MATERIALS

Mohamed Cherif M'ziane, Mohamed Salah Khelifi Touhami, Ali Grine, Zohir Younsi

SAAD Dahleb Blida 1 University

Abstract

The use of phase change materials (PCMs) to enhance the performance of thermal insulation in the building envelope is one of the effective solutions for energy efficiency, sustaining thermal comfort in buildings and contributing to the reduction of environmental pollution by releasing and absorbing energy during the phase change. This study deals with numerical study of the thermal behavior of new fiber insulation composite containing a microencapsulated PCM that can be embedded as a component in passive solar walls. Numerical simulation, it is based on the enthalpy method. Such a simulation was performed using a finite volume method (FVM). Then, a comparison between the two approaches is performed. It is found that our numerical findings match the analytical results. Our results obtained affirm that the thermal storage capacity of this new insulation incorporating PCMs in microcapsules is greatly improved due to the presence of PCMs.

Keywords://.

Corresponding author's:mezmoh2002@gmail.com
sciencesconf.org:ncmm2023: T11-2023264

PRODUCTION OF GREEN HYDROGEN BY WATER SPLITTING USING A NI-W ELECTRODES

Boughouiche Wissem 1 * ,Imane Abid 1 , Nada Boumazza 1 , Yazid Messaoudi 1 , Hamza Belhadj 2 And Amor Azizi 1 .

1 Laboratoire de Chimie, Ingénieure Moléculaire et Nanostructures, Département de Chimie, Faculté des Sciences, Université Ferhat Abbas Sétif 1, Sétif 19000, Algeria. 2 Unit of Research in Nanosciences and Nanotechnologies (URNN), Center for Development

Abstract

hydrogen is A clean, sustainable, and environmentally friendly energy source.Given this, hydrogen generation for energy systems appears to be the most promisingreplacement for limited fossil fuel supplies in the future. From this vantage point, electro-catalytic water splitting is gaining a lot of attention in comparison to other methods ofproducing hydrogen (such as coal gasification and steam reforming) because of its fairefficiency, lower prices, and environmental cleanliness. Consequently, electrochemistry'smost studied topic is the hydrogen evolution process (HER) in both acidic and alkaline media. For the aim of production of hydrogen, in this work we elaborate 6 electrodes of Ni-W and Ni-Mo with different concentration ratio by electrodeposition method using a threeelectrodes electrochemical cell for hydrogen evolution reaction; the hydrogen evolutionreaction (HER) activity on the obtained electrodes was studied using linear voltammetry,Tafel slope and electrochemical impedance spectroscopy (EIS) in alkaline solution (KOH1M). Linear voltammetry showed an improvement of the electrocatalytic activity of theelectrodes following the ratio Ni-W1/2, 1/1, 2/1 which presented tafel slopes of -95.9, -122.2,-151.8 mv/dec with an active surface area 176.5 , 134 and 143.5 respectively.

Keywords:*Hydrogen evolution ,electrochemical energy,NiW alloys, Alloys..*

Corresponding author's:wboughouiche@gmail.com
sciencesconf.org:ncmm2023: T13-2023131

NUMERICAL STUDY OF METHANOL STEAM REFORMING FOR HYDROGEN PRODUCTION (FUEL CELLS)

ABAIDI Abou houraira, MADANI Brahim

Laboratory of Multiphase Transport and Porous Media (LTPMP)

Abstract

The current work presents a numerical study of hydrogen production for fuel cells (production the electric power). This hydrogen is extracted from methanol steam reforming reactor; this reaction is occurred over the commercial catalyst CuO/ZnO/Al2O3. The COMSOL Multiphysics have used for the simulations. The objective of this work is to show the evolutions of each chemical species, also their efficiency of methanol consumption, and hydrogen production. The results showed that; the consumption of CH3OH and H2O and the production of H2, CO2 then little of CO. From current simulation conditions; the optimal mole fraction of Methanol is equal 0.51 %, consequently more fuel cell operating time.

Keywords:*Hydrogen production, Methanol steam reforming, reactor efficiency..*

Corresponding author's:abaidiadel70@gmail.com
sciencesconf.org:ncmm2023: T13-2023132

A CASE STUDY OF A STANDALONE WIND/HYDROGEN SYSTEM

Nourdine KABOUCHE, Fares MEZIANE, Ilyes NOUICER, Rafika BOUDRIES
Centre de développement des énergies renouvelables, CDER, 16340, Alger, Algérie

Abstract

The significance of a wind-based hydrogen production system lies in its capacity to harness the renewable energy generated by wind sources. This approach addresses the intermittency of wind power and offers both a sustainable and clean energy solution. Hydrogen boasts several advantages, including high mass-energy density and a versatile energy capacity. It can be stored for long periods without energy loss and serves as a viable alternative to fossil fuels or converted into electricity through fuel cells. In this work, an off-grid wind-based hydrogen system is studied. This system consists of a wind turbine of 300 kW supplying a main load of about 1 GWh/year, the excess of wind energy is converted into hydrogen via a 5O kW alkaline electrolyzer. In the case of a lack of wind energy, a secondary generator provides the power difference. The results showed an annual hydrogen production of approximately 2,5 tons, with wind energy of 0.99 GWh/year (CF = 37.7 %), shortage of 511 MWh, and energy losses of 173 MWh. it is necessary to introduce another renewable source, study the complete value chain, optimize the system, and carry out a technical-economic study later.

Keywords:*Hydrogen, water electrolysis, wind energy, off-grid system..*

Corresponding author's:nourdinekabouch@gmail.com
sciencesconf.org:ncmm2023: T13-2023133

EFFECT OF RECYCLED GRAVEL ON THE DURABILITY OF SELF-COMPACTING CONCRETE WITH DOUBLE-HOOK STEEL FIBER

Rachid RABEHI1, *, Mohamed RABEHI1, Mohammed OMRANE2, Ahmed Rafik BELAKHDAR3

1Laboratory (LDMM), Civil Engineering Department, University of Djelfa, Algeria. 2Applied Automation and Industrial Diagnostic Laboratory, University of Djelfa, Algeria. 3Mining Laboratory, Department of Civil Engineering, Larbi Tebessi University, Tebess

Abstract

To enable concrete to be used in structures with more intricate and heavily reinforced sections, research has recently been conducted in Japan to develop concrete formulations with high workability while remaining stable. low bleeding, compaction, and segregation) with good mechanical qualities. Self-compacting concrete (SCC), a novel type of concrete that can fulfill the aforementioned properties, is the outcome of this research. The use of high volume of fines, a high volume of paste, superplasticizers, and a low volume of gravel are what set SCC apart. In order to further the objectives of environmental preservation and sustainable development, recycled gravel may eventually replace crushed gravel due to the rising demand for aggregates. To enhance the properties of recycled concrete and gravel SCCs, steel fibers are added. The purpose of this study is to investigate the physico-mechanical properties and durability of SCC made from recycled gravel. The best recycled gravel contains 50%, and adding 0.5% fibers enhances the properties of these SCC, according to the results.

Keywords:*Double-hook steel fiber, Self-compacting concrete, Physico-mechanical properties, Durability, Recycled gravel.*.

Corresponding author's:rachid.rabehi@univ-djelfa.dz
sciencesconf.org:ncmm2023: T13-2023134

FEASIBILITY STUDY OF A CENTRAL RECEIVER CONCENTRATED SOLAR POWER PLANT FOR GREEN HYDROGEN PRODUCTION IN ALGERIA.

Gh. AFFIF CHAOUCHE 1,*, S. BOUDAOUD 1, K. MOHAMMEDI1 , A. KHELLAF2,

(1) URMPE, M. Bougara University, Boumerdès-35000 Algeria (2) CDER, route de l'observatoire, Bouzareah Algiers-16000 Algeria

Abstract

Green hydrogen is considered as a silver bullet for long term energy strategy when it comes to define pathways towards a low-carbon and sustainable future. In 2021, China produced about 33 million metric tons of hydrogen, making it the world's largest hydrogen producer as it aims to establish an ecosystem of diverse green hydrogen applications including transportation and energy storage. The present work gives insight for a pre-feasibility study of a solar concentration technology power plant for green hydrogen production in Algeria. The models used take into account project costs and site characteristics and integrate engineering knowledge (economic, social, technical and environmental). The obtained results are: the total cost of the project, indicators with economic, social, technical and environmental aspects. The study was carried out using SAM software which showed its capabilities and its usefulness for producing expertise for the different stakeholders through an application on a given site.

Keywords:*Green hydrogen, Concentrated Solar Power, Solar tower, SAM,*

Corresponding author's:gh.affifchaouche@univ-boumerdes.dz
sciencesconf.org:ncmm2023: T13-2023151

EXPERIMENTAL AND FACTORIAL DESIGN OF THE PHYSICAL PROPERTIES OF CONCRETE MIXED WITH RUBBER AND PLASTIC WASTE

Ameur BELMOUHOUB 1, Mohammed ichem BENHALILOU 2, and Assia ABDELOUAHED 1

1) Department of Civil Engineering, 20 Août 1955 University of Skikda, Algeria.2)University of BATNA, Technical Science, Civil Engineering, Algeria

Abstract

The environment and human health are negatively impacted by the buildup of plastic and rubber trash. Some researchers used these wastes in civil engineering, in this work, we used these waste in the concrete. The aim of this work is to compare the laboratory results with the results of the JMP pilot test program, and find out if there is a match between the results, where rubber was substituted in cement with 2 % and 4 % ratios, and plastic was substituted in sand with ratios of 2 %, 4 %, and 6 %. The tests were carried out on concrete in fresh properties, namely: consistency, density, and air content. The results indicated that the workability and fresh density decreases with increasing the percentage of rubber and plastic and the air content increases with increasing the percentage of rubber and plastic. The numerical modeling is assessed to have an appropriate coefficient R2 close to 1 for the workability, fresh density, and air content.

Keywords:*Rubber, Plastic, Fresh properties, Full factorial design..*

Corresponding author's:a.belmouhoub@univ-skikda.dz
sciencesconf.org:ncmm2023: T14-2023135

COMPREHENSIVE ANALYSIS OF WASTE FOUNDRY SAND AS A HOLISTIC SUBSTITUTE FOR NATURAL SAND IN CONCRETE

Fayçal Belaid, Souad Kherbache, Abdelkader Tahakourt
Laboratory of Construction Engineering and Architecture (LGCA)

Abstract

In the pursuit of advancing sustainable construction methodologies, the exploration of alternative materials in concrete production has become imperative to alleviate the environmental impact associated with conventional construction materials. Natural sand, a critical component of concrete, has historically been extracted from riverbeds and quarries, contributing to environmental challenges such as habitat disruption, riverbank erosion, and the depletion of vital water resources. This necessitates the exploration of innovative materials to curtail the ecological footprint of the construction industry. his research endeavors to delve into the potential of waste foundry sand as a partial substitute for natural sand in concrete, addressing both environmental concerns and disposal challenges associated with this byproduct of the metal casting industry. The conventional disposal of waste foundry sand has posed significant environmental burdens; however, its incorporation into concrete not only mitigates disposal issues but also presents a spectrum of advantages, including the conservation of natural resources, reduction of landfill space, and a decrease in carbon emissions linked to traditional sand mining and transportation. The primary objective of this study is to conduct a comprehensive investigation into the feasibility of utilizing waste foundry sand as an eco-friendly alternative to natural sand in concrete mixtures. The research aims to evaluate the mechanical, physical, and environmental properties of concrete by incorporating varying proportions of waste foundry sand. Through a systematic analysis, this study aims to contribute valuable insights to the discourse on sustainable construction practices, providing a foundation for the adoption of waste foundry sand as a viable and environmentally friendly substitute in concrete production.

Keywords:*Sustainable construction, waste foundry sand, environmental impact, alternative materials, natural sand substitute*.

Corresponding author's:faycal.belaid@univ-bejaia.dz
sciencesconf.org:ncmm2023: T14-2023136

THERMOMECHANICAL BEHAVIOR OF A COMPOSITE MATERIAL UNDER BENDING LOADS

Tayeb AYAD1, Ahmed REZIGUA2

Laboratory of Materials &Construction Process, University of Mostaganem 27000 Algeria

Abstract

The present work is mainly interested in the thermo-mechanical behavior of a structure reinforced with CFRP sheets and the effect on the durability of the reinforcement at the concrete-CFRP interface. By developing analytical models validated by numerical developments, with simulations on a structural design softwareTo develop technical suggestions for the long-lasting repair of reinforced concrete structures. By following analysis procedures that estimate the strength of adhesively bonded single-lap and lap-shear joints, a theoretical analysis on interface shear stresses of a simply supported concrete beam pre-cracked and bonded with a CFRP plate was established. Based on an evaluation of all current treatments, the fracture impact is ignored. The CFRP plate-bonded reinforced concrete structure's mechanical parameter change is taken into account in the finite element model. The analytical advancement in the current work is contrasted with results of tested CFRP reinforced concretes produced by ANSYS WB numerical results and other researchers. To clarify the consequences of the different features of CFRP, a parametric study was established to explain the effects of the variation property of CFRP and the effectiveness of thermal protection of insulation.The determined temperature of CFRP sheets is 218 C°, above this temperature the carbon fibers lose their strength and structural integrity.The increase in temperature affects and reduces the stress distribution of the concrete/CFRP interface as opposed to the applied load.

Keywords:*Composite, Mechanic, Temperature, Carbon Fiber, Shear Stress..*

Corresponding author's:tayeb.ayad@univ-mosta.dz
sciencesconf.org:ncmm2023: T14-2023137

PERFORMANCE EVALUATION OF RC FRAMES RETROFITTED USING RC JACKETED COLUMNS

Meriem BOUDERRADJI1, Mohamed Salah DIMIA1 , Noureddine LAHBARI2, Ahmed Rafik BELAKHDAR3, Soumia GHERABLI1

1Applied Hydraulics Research Laboratory University of Batna 2, Algeria 2Civil Engineering Laboratory - Risks And Structures In Interaction University of Batna 2, Algeria 3Mining Laboratory University of Larbi Tebessi, Algeria

Abstract

Strengthening and retrofitting approaches are typically used in existing buildings to upgrade their seismic behavior. RC jacketing columns is one of the most popular methods used for retrofitting an existing RC building. This effective technique improves the stiffness, flexural capacity and increases the lateral shear capacity of the columns. This technique employs an extra RC layer situated outside the original member's perimeter, with longitudinal and transverse reinforcements. The purpose of this research is to assess the impact of RC jacketing of columns on increasing the structural capacity of RC frames. Wherefore, a numerical investigation of the seismic performance of non-retrofitted and retrofitted one-, three- and five-story RC frames was carried out through the static pushover analysis using the non linear material and geometric software seismostruct. The results were presented by determining the base shear capacity of frames before and after using the RC jacketing method for columns frames. The numerical results show that the solutions proposed of using the RC jacketing in the three existing frames has good agreement results in terms of increasing the base shear capacity. Furthermore, the RC jacketing columns of the deficient RC frames not only retrieve their original strength but also significantly increase the lateral load capacity.

Keywords:*Seismic retrofit, RC columns jacketing, RC frames, Pushover analysis..*

Corresponding author's:m.bouderradji@univ-batna2.dz
sciencesconf.org:ncmm2023: T14-2023154

THERMAL BEHAVIOR OF STEEL COLUMN

Gherabli Soumia ,Mohammed Salah Dimia ,Meriem Bouderradji ,Ahmed Rafik Belakhdar

LRHYA Laboratory , Departement of Civil Engineering Faculty of Technology

Abstract

Structure behavior and their collapse are the most important fields of civil engineering. Many factors, such as earthquakes, explosions, landslides, and fire, may lead to collapse in structures. The exposure to fire is one of the dangerous factors that result a major loss of life and destruction of residential buildings. The goal of structural fire engineering is to determine how buildings and other structures will function in the event of an unintentional fire. Resent researches are mostly taking into account fire decay (cooling phase) in their numerical study ,this researches has proved that this phase is a critical phase for concrete structures because the high temperatures cause a degradation in their mechanical caracteristiques. This research presents a numerical study of the behavior of steel column subjected to naturel fire in order to investigate the effect of cooling phase for this steel elements .As a first step the study has examined the effect of exposing column to fire increasing temperature up to 1200 C° with different ventilation factor (0,1 , 0,02) .In the second step a protection was placed on the steel section, then both the result of both steps were compared for objective to determine the effect of protection the temperature field .

Keywords:*Steel column , thermal behavior , Cooling phase , Naturel fire.*

Corresponding author's:s.gherabli@univ-batna2.dz
sciencesconf.org:ncmm2023: T14-2023191

THE IMPACT OF POROSITY DISTRIBUTION ON THE BENDING OF POROUS FUNCTIONALLY GRADED SQUARE PLATE UNDER A UNIFORM LOAD

Soufiane Benounas;Mohamed-Ouejdi Belarbi;and Hicham Hirane
University of Biskra

Abstract

an eight-node quadrilateral isoparametric element with 5 degrees of freedom per node is proposed to investigate the bending response of porous functionally graded (FG) square plate using an improved first shear deformation theory. The modified first-order shear deformation theory (FSDT) refines the conventional Mindlin–Reissner theory by assuming a parabolic shear strain distribution to give a more realistic distribution of the shear strain through the thickness. The equations of motion are established through Hamilton's principle then solved by employing the finite element method. Numerical results for porous FG square plate under a uniform load are presented. These results are compared with existing literature to demonstrate the accuracy and efficiency of our findings.

Keywords://.

Corresponding author's:soufiane.benounas@univ-biskra.dz
sciencesconf.org:ncmm2023: T14-2023245

APPLICATION OF INTELLIGENCE ALGORITHMS TO A GROUP OF ROBOTS

Wissam HANAFI 1 ,Mohammed TAMALI 2

Bechar University, ENERGARID Lab. - SimulIA Team, Po Box 417, Kenadsa street, Bechar, Algeria

Abstract

With the continuous advancement of technology, collaborative robots in artificial intelligence have seen a very important and rapid development due to their use in all domains, especially in hostile, dangerous, and hard-to-reach environments where many robots are designed to perform jobs that are dangerous to humans. Several studies have made progress in this domain using various artificial intelligence algorithms. In this paper, we highlight two important algorithms and apply them to a group of robots in different challenging environments based on the gazebo simulator. The first algorithm is the search-based planning library (sbpl) algorithm, and the second is the a-star algorithm, and we compare them. The experimental results showed that both algorithms are suitable, but the a-star algorithm is best suited for robots to cooperate with each other to reach the targets without hitting obstacles in the shortest time compared to the sbpl algorithm because making the right decision will take a lot of time.

Keywords:*Swarm Robot, Collaboration Algorithms, Path Planning, ROS, Gazebo..*

Corresponding author's:hanafi.wissam@univ-bechar.dz
sciencesconf.org:ncmm2023: T15-2023139

ENHANCED HUMAN-ROBOT INTERACTION THROUGH HAND DETECTION

Roumaissa BEKIRI, Mohamed Chaouki BABAHENINI.
LESIA Laboratory, Mohamed Khider University, Biskra, Algeria

Abstract

Our research focuses on advancing the capabilities of robotics systems by integrating a state-of-the-art hand detection approach based on YOLOv7 (You Only Look Once version 7). We modified the proposed architecture depending to the input parameters, so that it is applicable for either single class detection (human hand) or two-class detection (both person and hand). For training, we used EgoHands datasets that encompasses a wide range of hand poses, backgrounds, and lighting conditions, ensuring the model's adaptability to real-world environments. The YOLOv7 architecture is employed for its efficiency and speed, allowing for real-time processing of visual input, a crucial factor in interactive robotics. Training the YOLOv7 model involves fine-tuning on the hand-specific dataset, leveraging transfer learning from pre-trained weights. The resulting model exhibits a heightened sensitivity to human hand features, providing accurate bounding box predictions. Post-processing techniques, including confidence score thresholding and non-maximum suppression, refine the detections for enhanced precision. The practical implications of this research extend to various HRI applications, including collaborative manufacturing, assistive technologies, and service robotics. The integration of YOLOv7-based hand detection into robotics systems facilitates intuitive gesture-based control, enabling users to convey commands and interact with robots in a more natural and efficient manner. Results from extensive experimentation showcase the effectiveness of the proposed approach in diverse HRI scenarios, demonstrating the model's robustness to occlusion, varying hand poses, and dynamic environmental conditions. The outcomes of this research contribute to the evolution of HRI by providing a reliable and responsive framework for hand gesture recognition, ultimately fostering a more symbiotic relationship between humans and robots. In conclusion, this research presents a comprehensive exploration of YOLOv7-based hand detection for Human-Robot Interaction, offering a significant stride towards creating intelligent and perceptive robotic systems capable of understanding and responding to human gestures with precision and speed.

Keywords:*Human-Robot-Interaction, Hand Detection, Deep Learning, YOLOv7, EgoHands.*

Corresponding author's:roumaissa.bekiri@univ-biskra.dz
sciencesconf.org:ncmm2023: T15-2023141

DESIGN AND IMPLEMENTATION OF A PROTOTYPE INTELLIGENT SYSTEM USING TINY-MACHINE LEARNING FOR MONITORING A GAS TURBINE

Karim BENALIA

Faculty of Hydrocarbons and Chemistry University of Boumerdes Boumerdes, Algeria

Abstract

We are interested in this paper in the study of the speed control system of a gas turbine at the level of the combined cycle thermal power plant of RAS-DJENET of the company SONELGAZ, with the realization of a prototype of intelligent monitoring using artificial intelligence techniques namely Tiny-Machine Learning (Tiny-ML) and Tensorflow for Microcontrollers based on an Arduino board. This prototype is essentially composed of two parts: The hardware part which contains all the components used, namely: Fan (which acts as the gas turbine), temperature and speed sensors, power batteries and microcontrollers, etc. The second part is the software part it contains two main programs: the Arduino program and the deployment of the learning model on an ATmega328P microcontroller of an ArduinoUno board. The test results of our prototype showed that the learning technique used was effective for intelligent system monitoring.

Keywords:*Tiny-ML , Tensorflo, wmonitoring a gas turbine.*

Corresponding author's:k.benalia@univ-boumerdes.dz
sciencesconf.org:ncmm2023: T15-2023142

NEW STATE FEEDBACK CONTROLLER OF TS FUZZY SYSTEMS WİTH UNMEASURED PREMİSE VARİABLES: APPLİCATİON TO SİNGLE-LİNK FLEXİBLE JOİNT ROBOT

Mohamed Yacine Hammoudi,Marah Bacha,Abdenacer Titaouine

1 Laboratory of Modeling of Energy Systems (LMSE), University of Biskra, Algeria ;2 Laboratory of Electrical Engineering of Biskra (LGEB), University of Biskra, Algeria

Abstract

This abstract presents a novel control methodology that leverages algorithms based on variables that are not directly measurable, employing a sector non-linearity approach with an emphasis on robotic control techniques. It offers a comparative analysis between traditional quadratic state feedback control and a more sophisticated nonquadratic method. The efficiency of these methods has been confirmed through numerical simulations, with a special focus on assessing their precision and dynamic performance using the Mean Value Theorem (MVT) as a standard of comparison. The findings highlight the robustness and efficacy of the proposed algorithms, particularly in managing the state of flexible joint links.

Keywords:*sector non-linearity, traditional quadratic, Mean Value Theorem power, flexible joint links ..*

Corresponding author's:rabiaa.houili@univ-biskra.dz
sciencesconf.org:ncmm2023: T15-2023143

ARTIFICIAL INTELLIGENCE IN EARTH SCIENCES FOR POROSITY PREDICTION IN PETROLEUM RESERVOIR FROM GEOPHYSICAL WELL-LOGS DATA. APPLICATION TO ALGERIAN SAHARA

Leila Aliouane 1, Sid-Ali Ouadfeul 2 and Amar Boudella3

1 Laboratoire Physique de la Terre, Faculté des Hydrocarbures et de la Chimie, Université M'Hamed Bougara de Boumerdes, Algeria 2 Institut Algerien du Pétrole- Sonatrach, Algeria 3 Université de M'sila, Algeria

Abstract

Artificial Intelligence techniques are becoming very popular in earth sciences, in the last decade, mainly in petroleum exploration and exploitation. Reservoir characterization by geophysical well-logs data analysis is commonly conducted and plays a central role in formation evaluation in petroleum domain. The most petrophysical parameters that describe the reservoir are the porosity, the permeability and the water saturation where the porosity is the main key. Using conventional methods, the estimation of the porosity is very difficult, mainly in shaly reservoirs where the presence of clay affects considerably, the porosity and the permeability. For that, we propose to accurately predict the porosity from geophysical recordings crossed the formation of wells using machine learning methods such as multilayer neural network. The input layer are constituted by the petrophysical well-logs data and the output layer presented by one neuron corresponding to the porosity predicted. The training step of neural network machine (NNM) is processed using core data (CORPOR) by minimizing the root mean square error using Radial Basis Function algorithm (RBF). Once trained, the model is then applied to the target wells to predict the porosity (PORRBF). The predicted porosity match the core values with good accuracy. This approach provides significantly a robust computation method and reduces dependency on prior domain knowledge.

Keywords:*Artificial Intelligence Earth sciences, Porosity prediction, geophysical well-logs.*

Corresponding author's:l.aliouane@univ-boumerdes.dz
sciencesconf.org:ncmm2023: T15-2023144

CONTROL AND DIAGNOSTICS OF ROTATING MACHINES USING ARTIFICIAL INTELLIGENCE ALGORITHMS

Abdelmalek Khebli 1 , Hocine Meglouli1, Salah Aguib2

1- Laboratoire Electrification des Entreprises Industrielles,Université de Boumerdès algerie 3500 - 2 Laboratoire Dynamique des Moteurs et Vibroacoustique, Université de Boumerdes 35000

Abstract

This work presents fault detection in rotating machines using artificial neural networks (ANN). An experimental test bench is used to acquire bearing vibration signals. During this study, we first implemented algorithms which allowed us to extract characteristics from the signals of a rotating machine. Then, we set up a system to monitor the state of this machine by setting a threshold for proper operation and another to trigger an alarm when the latter is reached. Secondly, we used artificial inelegance algorithms to classify the different levels of failure.

Keywords:*Neural network, Random Forest, fault classification.*

Corresponding author's:khebli_m@yahoo.fr
sciencesconf.org:ncmm2023: T15-2023145

NONLINEAR SYSTEM STATE ESTIMATION WITH UNMEASURABLE PREMISES: A NOVEL APPROACH USING LINE INTEGRAL LYAPUNOV FUNCTION

Khalida MIMOUNE 1, Mohamed Yacine HAMMOUDI 1, Wail HAMDI 1, Souri Mohamed MIMOUNE 1

1. MSE Laboratory, University of Biskra, 07000, Algeria

Abstract

This research introduces a groundbreaking technique by utilizing a non-quadratic Lyapunov function, aiming to significantly enhance the accuracy of nonlinear observers in continuous-time Takagi–Sugeno fuzzy systems, especially those with Unmeasurable premise variables. Such systems are inherently more complex than their counterparts with measurable variables, presenting unique analytical challenges. To address these, the study innovatively applies the mean value theorem combined with sector nonlinearity transformation. This dual approach effectively transforms the nonlinear error dynamics characteristic of these systems into a linear parameter-varying model.A central innovation of this study is the introduction of the line integral Lyapunov function. This function, based on the integration of membership functions, is pivotal in ensuring the global stability of the fuzzy systems under study. It marks a significant departure from traditional quadratic Lyapunov functions and offers multiple advantages. Moreover, this approach excels in accurately capturing the trajectory behavior of the system, a critical aspect often overlooked in conventional models. The stability conditions proposed in this research are articulated as linear matrix inequalities. These conditions are less restrictive compared to traditional methods and can be resolved efficiently through linear programming techniques, utilizing state-of-the-art software tools. This makes the proposed method not only more effective but also more accessible for practical applications.To demonstrate the practicality and robustness of the proposed methodology, the study includes a real-world application. The results from this test are compelling, clearly illustrating the superiority of the proposed method over conventional techniques. The success of this experiment underscores the potential of this novel approach to significantly improve the precision and efficiency in managing complex fuzzy systems, opening new avenues for research and application in the field.

Keywords:*TAKAGI-SUGENO, FUZZY SYSTEMS, MEAN VALUE THEOREM, NONLINEAR SYSTEMS, FUZZY OBSERVER..*

Corresponding author's:khalida.mimoune@univ-biskra.dz
sciencesconf.org:ncmm2023: T15-2023147

DESIGN AND EVALUATION OF A DECOUPLED UNKNOWN-INPUT OBSERVER FOR THE SYNCHRONOUS RELUCTANCE MOTOR USING TAKAGI-SUGENO FUZZY REPRESENTATION

Wail HAMDI, Mohamed Yacine HAMMOUDI, Anouar BOUKHLOUF, Ilyes BENAISSA

Laboratoire de Modélisation des Systèmes Energétiques (LMSE)

Abstract

This study presents the design of an Unknown-Input Observer for Takagi-Sugeno (T-S) systems, tailored for the Synchronous Reluctance Motor (SynRM). The proposed observer is based on the decoupling approach that minimize the effect of unknown inputs on the estimation error dynamics. This method improves precision in estimating the states and the unknown inputs. Using the quadratic Lyapunov function, stability conditions are formulated as linear matrix inequality (LMI) constraints, guaranteeing the estimation error convergence. The method's efficiency is confirmed through simulation test.

Keywords:*Synchronous Reluctance Motor, Takagi-Sugeno Systems, Decoupled Unknown Input Observer, Fuzzy Observer.*

Corresponding author's:wail.hamdi@univ-biskra.dz
sciencesconf.org:ncmm2023: T15-2023163

USING GRAMMER AND SINGER DIRECT MULTI-CLASS SVM FOR SHORT-CIRCUIT FAULTS DETECTION AND DISCRIMINATION IN HIGH VOLTAGE POWER LINES.

Mounia Hendel, Behilil Sakina

Ecole Supérieure en Génie Electrique et Energétique d'Oran (ESGEE) Laboratoire de Génie Electrique et Matériaux (LGEM) Oran, Algeria.

Abstract

The power grid is a critical part of our energy infrastructure, enabling electrical energy distribution and transmission. The electricity network is mainly subdivided into four levels, the production level, whose role is to produce electricity; the transmission level, which allows electricity to be transported to consumption regions; the distribution level and the dispatching level, which are responsible for adapting the voltage for special infrastructures and for consumers respectively. To guarantee efficient and stable distribution of electricity, the electrical network employs a constituents set that are equally important to each other. All the same, transmission lines remain the electrical network key component. It plays a crucial role in the transmission and distribution process by enabling the efficient transfer of electrical energy.However, the lines are regularly confronted with mistrust which can be caused by various factors, more particularly, extreme environmental conditions. However, short circuits remain the most persistent faults and are regularly the main cause of other faults types. In this sense, the proposed paper aims to propose a new automatic system for the detection and discrimination of short circuits in high voltage transmission lines with photovoltaic energy source. First, the current and voltage signals are split into a set of small segments each lasting 20 ms. Secondly, the segments are reduced to 60 samples using the Discrete Wavelet Transform (DWT), these samples are then normalized in order to have all the descriptors at the same level. Thirdly, a system based on a Grammer and Singer direct multi-class SVM is proposed for the detection and then identification of the short circuit type. The proposed system was validated on a database consisting of signals obtained from a PV energy source line simulated in accordance with the Algerian standard [1]. The results obtained are of the order : of 100% for identification and of 98.75% for classification, thus improving the effectiveness of the proposed automatic system.

Keywords:*Short-circuit, direct M-SVM, DWT, Grammer and Singer M-SVM, High voltage power lines..*

Corresponding author's:mounia_90@hotmail.com
sciencesconf.org:ncmm2023: T15-2023166

REAL-TIME IMPLEMENTATION OF A FUZZY-PID CONTROLLER FOR A HELICOPTER SYSTEM

Ratiba FELLAG 1 , Mahmoud BELHOCINE 1 , Meziane HAMEL 2

1 Robotics and Industrial Automation Division, Center for Development of Advanced Technologies (CDTA), Algiers, 16000, Algeria 2 Laboratory of Energy and Mechanical Engineering (LEMI), M'Hamed Bougara University, Boumerdès, 35000, Algeria

Abstract

In recent years, there has been a growing interest in integrating artificial intelligence into control system design. Fuzzy logic, proposed by Zadah in 1965, introduced the concept of using linguistic variables to emulate human reasoning in decision-making. Unlike conventional PID controllers that rely on fixed, pre-defined parameters, a fuzzy PID controller incorporates linguistic rules and membership functions to adapt the gains to changing conditions and uncertainties based on real-time system behavior. In this work, a fuzzy PID controller is designed to achieve trajectory tracking of a 2-Degree-of-Freedom (2-DOF) helicopter system. The performance of the controller is evaluated in real-time using the Quanser Aero 2 Helicopter system available at the control laboratory of the Center of Development of Advanced Technologies (CDTA, Algiers). Results demonstrate robust trajectory tracking for sinusoidal reference trajectories for both pitch and yaw angles. The study contributes to the understanding of fuzzy PID controllers in dynamic, real-world applications.

Keywords:*Trajectory tracking, helicopter, fuzzy logic, pid, hardware validation.*

Corresponding author's:rfellag@cdta.dz
sciencesconf.org:ncmm2023: T15-2023174

A NEW ADVANCED OXIDATION PROCESS FOR THE DEGRADATION OF EMERGING ORGANIC POLLUTANTS

Aouattef BELGHIT,

Laboratory of envirommental engeneering process(LIPE) University of constantine3

Abstract

Industries such as textiles, paper, cosmetics, leather, agricultural research, pharmaceuticals and food produce large volumes of wastewater polluted by high concentrations of dyes and other components . It has been estimated that the textile industry consumes around 21-377 m3 of water per tonne of textile produced The concentrations of dyes in the effluent must be reduced to acceptable limits before they are released into the environment. In order to preserve and improve the quality of these waters, several conventional treatment techniques have been developed in recent years. They involve a number of physico-chemical processes, chemical oxidation coagulation/flocculation and biodegradation However, several studies have reported that these conventional are unable to eliminate all the organic matter present in textile effluent in textile effluents . Consequently, advanced advanced oxidation processes are applied for the chemical treatment of wastewater to achieve complete mineralization of pollutants, or at least to transform them into biodegradable and more harmless products . In this work,the degradation of an organic pollutant by an innovative periodate/hydroxylamine (PI/HA) process . The effect of treatment conditions and minerals such as salts on the efficiency of the PI/HA process was examined.

Keywords:*ORGANIC POLLUTANT , PERIODATE/HYDROXYLAMINE.*

Corresponding author's:belghitawatef325@gmail.com
sciencesconf.org:ncmm2023: T16-2023149

MODILISATION OF ELECTRON-MATTER INTERACTION: SHORTRANGE POTENTIAL EFFECT IN THE INITIAL STATE

Tarek KHATIR1, Salim. HOUAMER2

CRNA, 02, Boulevard Frantz Fanon, B.P. 399 Alger RP, University Sétif1, Setif, Algeria

Abstract

Electron impact ionization of atoms and molecules is a basic process in collision physics, which plays a significant role in number of fundamental areas. The triply differential cross section (TDCS) obtained in (e, 2e) experiments represent the most detailed description of the ionization process. A new theoretical approach is used to calculate (TDCS) of (e,2e) reactions, which is the most sensitive test for theoretical models. We use here two models to calculate the TDCS, where the post collisionnal interaction (PCI) between the outgoing electrons is taken into account. In the First model (called BBK), the interaction between the projectile and the target is purely Coulombic. The second model called BBKSR where the interaction between the projectile and the target now is no longer purely Coulombic but includes in addition to this the short range potential.

Keywords:*Ionization, Electron, Cross Section, Post-Collisional Interaction.*

Corresponding author's:tarekkhatir@yahoo.com
sciencesconf.org:ncmm2023: T01-2023029

ENHANCING LUBRICANTS USING GRAPHITE NANOPLATES

Adel Baiti, Samir ACHOURI

Mechanical engineering, University of Batna 2, Algeria

Abstract

In the pursuit of refining the tribological characteristics of lubricants, a variety of additives are employed, among which nanoparticles, specifically graphene, hold a prominent position. These additives play a crucial role in reducing both friction and wear by averting direct contact. With a focus on harnessing the remarkable tribological benefits offered by graphene, we shall now delve into the primary methods of its production.Undoubtedly, the most favorable technique for obtaining graphene to enhance lubricants is the liquid-phase shear exfoliation of crystalline graphite. This method ensures the homogeneous dispersion of nanoplates within oil mixtures, thereby ensuring the stable performance of lubricants in scenarios involving friction. Extensive research has demonstrated that when lubricants are fortified with graphite nanoplates, they not only manifest improved tribological properties but also generate a protective anti-friction film on the surfaces experiencing friction. Our analysis encompasses an examination of the composition of this anti-friction film, as well as the outcomes resulting from its application.Furthermore, we shall outline approaches aimed at enhancing the technological processes involved in modifying lubricants with graphite nanoplates. These advancements seek to optimize the performance of lubricants, thus contributing to the ongoing evolution of tribological systems.

Keywords:*tribological characteristics, graphite nanoplates, lubricants, exfoliation, graphene.*

Corresponding author's:adelbaiti1@gmail.com
sciencesconf.org:ncmm2023: T01-2023172

THE MECHANICAL PROPERTIES OF AN UNSATURATED POLYESTER COMPOSITE REINFORCED WITH HALFA FIBERS ARE EXAMINED IN RELATION TO THE ADDITION OF MARBLE POWDER AND ITS CHEMICAL TREATMENT

Serine ARIS1, *, Azzedine BENYAHIA1, Nadir DEGHFEL2, Chouki FARSI3, Imane MOUSSAOUI1, Nour El houda DERRADJ1 *

Laboratory: City, Society, Environment and Sustainable Development, University Mohamed Boudiaf - M'sila, Algeria

Abstract

The unsaturated polyester matrix was reinforced with Alfa fibers and treated with marble as an additive throughout the preparation of the composite. Enhancing the mechanical qualities of this composite is the goal of this research. High physical and chemical qualities that are abundant in nature, such as light weight, biodegradability, and affordability, define alfalfa fibers. Vegetable fibers were able to compete with synthetic fibers due to these qualities. To enhance the Alfa fibers' surface, we treated them for 24 hours with benzoyl, 0.2% permanganate, and 9% soda, then microwaved them for 10 minutes. As compared to the untreated fibers, the mechanical properties of the composite and the fibers improved after being treated with soda at a concentration of 9% for 24 hours, according to the findings of the tests performed on the material. Additional treatments demonstrated that the marble addition significantly improved the mechanical behavior. This study used tensile testing and infrared spectroscopy as diagnostic tools.

Keywords:*Additive, Stipa Tenacissima, Unsaturated Polyester, Composite, Tensile strength.*

Corresponding author's:serine.aris@univ-msila.dz
sciencesconf.org:ncmm2023: T07-2023078

FINITE ELEMENT SIMULATION OF ELASTIC CONTACT PROBLEM

Fadila GUERRACHE1, Hamid BOUTOUTAOU2, Madjid HACHEMI3, Allal BEDLAOUI4

1,2,3,4 Laboratory of Energy, Mechanical and Engineering, Faculty of Technology, University of M'hamed Bougara, Boumerdes, Algeria

Abstract

The numerical method is applied to the contact problem of an elastic layer partially reposing on a rigid circular base, and is indented along the upper surface with a rigid punch. The contact between the medium and the rigid base is smooth. For this aim, two-dimensional analysis has been performed using Finite Element Method (FEM) based software called ABAQUS. The distribution of normal displacement and normal stress are obtained for various values of the thickness layer and the base radius with discussion..

Keywords:*Contact mechanics, Elastic layer, Circular base, Rigid punch, Finite Element Method..*

Corresponding author's:f.guerrache@univ-boumerdes.dz
sciencesconf.org:ncmm2023: T02-2023043

TENSILE BEHAVIOR AND STATISTICAL ANALYSIS OF NEW NATURAL FIBERS AS POTENTIAL REINFORCEMENT FOR INDUSTRIAL POLYMER BIOCOMPOSITES

Abdelwaheb HADOU1, Imane LALAYMIA1, and Abdelatif HOUSSEM EDDINE1, Oussama FERFARI1, Ahmed BELAADI2

1 Laboratory LGMM, University 20 August 1955- Skikda, El-Hadaiek Skikda, Algeria. 2 Department of Mechanical Engineering, University 20 August 1955- Skikda, El-Hadaiek Skikda, Algeria.

Abstract

Researchers are increasingly drawn to the potential of Washingtonia fiber (WF) as a substitute for commonly utilized fibers like synthetic or glass fibers. The objective of this work was to ascertain the mechanical properties of Washingtonia fibers with a gauge length (GL) of 40 mm under quasi-static tensile conditions. A series of tensile experiments were conducted on a sample of 30 plant fibers in order to ascertain the strain at break and Young's modulus of these fibers. A statistical analysis is required to account for the variability in the mechanical tensile properties of WF fibers, as is commonly observed in natural fibers. Therefore, in order to investigate this dispersion, statistical techniques such as the two- and three-parameter Weibull distribution at a 95% confidence level (CI) and the one-way analysis of variance ANOVA were employed.

Keywords:*natural fibers, polymer biocomposites, reinforcement, ANOVA*..

Corresponding author's:wahebhadou@gmail.com
sciencesconf.org:ncmm2023: T07-2023088

CHARACTERIZATION OF THE MECHANICAL PROPERTIES OF A WELDED JOINT BETWEEN TWO (02) DISSIMILAR MATERIALS

CHEBBAB Brahim 1, IFRAH Walid1

1-Dynamic Motors and Vibroacoustic Laboratory, Faculty of Technology, University of Boumerdes, Algeria.

Abstract

In the present work, the interest is focused on the characterization of the mechanical properties of a welded joint of two (02) dissimilar materials, duplex steel and iron-carbon steel. The mechanical properties of the weld joint of the 02 materials considered were obtained from the characterization tests planned for these specimens, i.e. the behavior of the weld joint in tension and hardness. A simulation was carried out using ABAQUS software to model the two weld seams and the heat-affected zone (HAZ) of the two steels and the filler metal. Observational analyses of the two bond zones (HAZ) on a microscopic scale using a Scanning Electron Microscope (SEM) and on a macroscopic scale using a Morphological Microscope (MM) were also carried out on this weld joint. In conclusion, the yield strength and toughness of the specimens produced were accepted. The properties of the welded joints meet the acceptability criteria defined by the standards applied to the transport of hydrocarbons.

Keywords:*Duplex steels, dissimilar steels, HAZ. of two different steels.*

Corresponding author's:b.chebbab@univ-boumerdes.dz
sciencesconf.org:ncmm2023: T01-2023247

ANALYSE OF THE RELIABILITY AND AVAILABILITY OF THE ALGIERS METRO TRACTION SYSTEM

Hakim SIGUERDJIDJEN1, Abdelkrim MERAH1

1M'Hamed Bougara University, Faculty of Technology, 3500 Boumerdes, Algeria.

Abstract

Rail transport by metro is a socio-economic form of transport, and the reliability of tractionsystems is considered to be one of the key factors required to ensure its smoothoperation, safety and public comfort. As well as providing rapid mobility for citizens between different areas of a city and reducing road congestion in urban areas by offering a fast,efficient transport alternative. To this end, a study to assess and compare the reliability and availability of two series of traction systems of the same type for the Algiers metro is needed to minimise unplanned downtime and maintain a high level of service for users. This research is based on in-depth analysis of the most frequent uptime data, failures and breakdowns (mechanical, electrical, ...etc.) of these traction systems obtained by the Eldjazair metro company, using Weibull's law (Probability of correct operation R (t; γ, η, β)) to determine their reliability, model their lifetimes and estimate their failure rate over time. The results obtained show a difference between the Weibull parameters (β, η, γ=0) for each study case according to their MTBF and that the failure rate of the first series of the traction system is higher and its reliability and lower compared to the second series of the traction system is a little over 50%. This will enable the right type of maintenance to be chosen, tasks to be properly managed and planned, repair times to be reduced, and the overall, reliability and availability of the Algiers metro's traction system to be improved..

Keywords: *Failures, Weibulls Law, Reliability, Availability, MTBF.*

Corresponding author's: h.siguerdjidjene@univ-boumerdes.dz
sciencesconf.org:ncmm2023: T16-2023148

NON-DESTRUCTIVE CHARACTERIZATION OF ALFA/PLA BIO-COMPOSITE USING IMPULSE EXCITATION TECHNIQUE (IET)

khalil BENABDERAZAG 1 2, Moussa GUEBAILIA 2

1 Centre de Recherche en Technologie des Semi-conducteurs pour l'Energetique (C.R.T.S.E), 02 Bd., Frantz FANON, B.P. 140, Algiers, Algeria. 2 Laboratoire de mécanique appliquée et systèmes énergétiques, Kasdi Merbah Ouargla University, BP 511,30000 Ouargla, Algeria.

Abstract

This study investigates the mechanical properties of Neat PLA and bio-composite Alfa Short Fibers/PLA, which are sustainable materials with promising applications in various industries. The study uses the Impulse Excitation Technique (IET), a non-destructive method that measures the mechanical behavior of materials by exciting vibrations and analyzing their response. The IET results are compared with conventional flexural tests to assess the efficiency and reliability of the non-destructive technique. The results show that the average modulus of elasticity (E) for the Alfa/PLA bio-composite is 2.9 GPa with flexural tests and 3.6 GPa with IET, while for the Neat PLA it is 2.6 GPa with flexural tests and 3.1 GPa with IET. The average difference between the experimental and the IET results is about 19%. The study concludes that IET can effectively characterize the mechanical properties of Neat PLA and the Alfa short fibers/PLA bio-composite, providing valuable insights into their mechanical performance. The study demonstrates the potential of IET as a non-destructive tool for advancing the development and utilization of eco-friendly materials in the engineering and manufacturing sectors.

Keywords: *mechanical properties, bio-composites, non-destructive testing, Impulse Excitation Technique (IET)..*

Corresponding author's: benabderazag@crtse.dz
sciencesconf.org:ncmm2023: T06-2023064

THE CREATİON OF AN ELECTROCHEMİCAL SENSOR THAT RELİES ON A COMPOSİTE MATERİAL COMPOSED OF P2MTH/ MWCNTS /NPS

Dounia SMANI 1*, Naima MAOUCHE 1

1 Laboratoire d'Electrochimie et Matériaux (LEM), Département de Génie des Procédés, Faculté de Technologie, Université Ferhat ABBAS Sétif-1, Algérie.

Abstract

The study aims to create a modified electrode by poly2methylthiophene (P2MTh) with multi weld carbon nanotubes (MWCNTs) and Nanoparticles (NPs) to enhance electrochemical and electronic properties. Carbon nanotubes, discovered in 1991, have been extensively researched due to their high electrical conductivity and large specific surface area. The composite materials were synthesized using electrochemical methods, and the electrochemical behavior was evaluated using cyclic voltammetry, electrochemical impedance spectroscopy, and square wave voltammetry. The insertion of MWCNTs improved the polymer's conductivity properties, reducing resistance in the composite electrode materials. The electrocatalytic performance of the modified electrode showed better catalytic activity compared to the poly2methiophene film. The use of P2MTh/ MWCNTs /NPs nanocomposite allows for better sensitivity due to increased electrode conductivity and fast charge transfer interface. The modified films impedance diagrams also show decrease resistance and increase oxidation peak intensity. This modified electrode can be used for various biological molecule detection.The surface morphology of pure P2MTh and P2MTh/ MWCNTs /NPs we used scanning electron microscope (SEM) and atomic force microscope(AFM) .the obtained findings also serve to illustrate that the utilization of the P2MTh/ MWCNTs /NPs nanocomposite facilitates heightened sensitivity as a result of the augmentation of the electrode's conductivity and the swift transfer of charge at the interface of the electrode and electrolyte

Keywords: *Composite material; Nanoparticles; MWCNTs; P2MTh; electrochemical sensor; SEM .*

Corresponding author's: dounismani1997@gmail.com
sciencesconf.org:ncmm2023: T01-2023027

COMPARATIVE STUDY BETWEEN TWO APPROCHES CFD AND BEM TO INVESTIGATE THE WIND TURBINE PERFORMANCE

BEKKAI Riyadh, Roudoane laouar, Rouigui imen, Mdouki ramzi, Mekahlia alla edine

Echahid cheikh Larbi Tebessi University, Algérie.

Abstract

The current study focused on the design and analyses the performance of micro-horizontal axis wind turbine blade based on comparison between two approaches. Moreover, has been used the blade- element- momentum theory (BEM), for design and evaluated blade performance based on the open source (Qblade) software after choosing the optimal tip speed ratio of TSR-3.5 in lower Reynolds number, Re-10, for NACA4412 airfoil profile, the CFD analyses based on the RANS equations has been used to investigate and gives 3D flow characteristics, pressure field between the upper and lower surface of blade and performance for the turbine blade with higher accurate. the difference results between two approaches are estimated approximately 10%. additionally, when using BEM with all corrections can be gives realistic condition during operation for wind turbine.

Keywords: //.

Corresponding author's: riyadh.bekkai@univ-tebessa.dz
sciencesconf.org:ncmm2023: T11-2023241

PREDICTION OF CHATTER STABILITY OF THIN-WALLED PARTS CONSIDERING VARIATION OF DYNAMIC CHARACTERISTICS BASED ON SURFACE ROUGHNESS MEASUREMENT

K Ikkache1, A Chellil 1, M Damous 2 , A Chelli 2, H Mechakra 1

1 Dynamics motors and vibroacoustics laboratory, M'Hamed Bougara University of Boumerdes Algeria. 2 Means and mobility researche laboratory Elharache Algeria. Algérie.

Abstract

The chatter cutting phenomenon is more common for milling thin-walled parts due to low rigidity, which can have a detrimental effect on the machined surface of the part. In addition, the dynamic characteristics of thin-walled parts vary along the tool path. In order to avoid the chatter phenomenon, a new model based on the influences of dynamic characteristics and using the semi-discretization method was established in this paper. Experimental tests were carried out to validate the established model. In addition, a parametric study is carried out by varying the cutting parameters to discuss the machining stability.

Keywords: *milling; cutter cutting; surface roughness.*

Corresponding author's: ikkachekamel@gmail.com
sciencesconf.org:ncmm2023: T02-2023040

IMPROVING THE PERFORMANCE OF HIGH-VOLTAGE DIRECT CURRENT (HVDC) ELECTRICAL POWER TRANSMISSION SYSTEMS USING THE MODULAR MULTILEVEL MULTICELL CONVERTERS

Abderrezak AIBECHE1, Aimad BOUDOUDA1, Hamza AKROUM1, Madjid KIDOUCHE1, Mohamed Zinelabidine DOGHMANE1

1 University of -Boumerdes, Applied Automation Laboratory, , Faculty of Hydrocarbons and ChemistryBoumerdes,Algeria- University of Boumerdes, LIST Laboratory, , Faculty of Technology, Boumerdes,Algeria

Abstract

High voltage direct current (HVDC) power transmission is currently expanding worldwide. There are two main reasons for this development. The first is the difficulty of building new overhead lines to support the development of the high-voltage network, which means that underground cables are increasingly being used. Beyond this limit, the solution is generally to transport the energy in direct current. The second factor is related to the development of offshore wind power, which requires the connection of power of several hundred MW to the regional/continental grid by means of cables whose length can reach several hundred km, and which therefore requires HVDC transmission.Rapid technological developments of voltage-source converters for high-voltage direct-current (VSC-HVDC) transmission systems in recent years have attracted significant research interest in high-voltage high-power converters and DC switchgear. Integrating these converters into high-voltage electrical energy transmission systems provides better performance for managing a large quantity of electrical energy transported and distributed on the electrical network.At present, modular multilevel converters (MMCs) are the preferred choice of electric power sectors when designing VSC-HVDC transmission systems with important powers.The reasons are the following: their modularity permits easy incorporation of redundant cells into each arm to facilitate continued operation should a (limited) number of cell capacitors and switching devices fail; offers the best tradeoff between semiconductor loss and performance; and seamless current commutation between converter arms.The objective of this research work is to model the different elements of an HVDC chain and then to perform simulations on a proposed configuration of the HVDC network to see the robustness of the control systems and to verify the operation of the system in the presence of multiple disturbances..

Keywords: *HVDC, VSC-HVDC, MMC, Power Transmission, High-Voltage Network.*

Corresponding author's: aibeche_umbb@univ-boumerdes.dz
sciencesconf.org:ncmm2023: T10-2023153

EFFECT OF TREATED NANOCLAYS ON THE MECHANICAL PROPERTIES OF POLYPROPYLENE/POLYAMIDE66 NANOCOMOPOSITES

Benalia KOUINI1,* Asma Nour El Houda SID2, Amina HACHAICHI3

(1) Laboratory of caotings, Materials and Environment, M'Hamed Bougara University – Boumerdes Algeria (2) M'Hamed Bougara University –Boumerdes , Algeria

Abstract

Nanocomposites based on polypropylene/polyamide66 (PP/PA66) nanoblends containing organophilicmontmorillonite (OMMT) and maleic anhydride grafted polypropylene (PP-g-MAH) were prepared by melt compounding method followed by injection molding. Two different types of nanoclayswere used in this work, i.e. DELLITE LVF (untreated): is a nano-clay deriving from a naturally occurring especially purified montmorillonite and DELLITE 67G (treated with a high content of quaternary ammonium salt (dimethyl dehydrogenated tallow ammonium). The rheological results revealed a drastic reduction in MFI with a levelling off at 5 wt.% for the nanoblends containing treated clay. The impact properties of PP/PA66 modified nanoblends were improved significantly in the presence of treated nanoclay. The morphology of the nanocomposites was studied using the XR diffraction (XRD). ¬XRD results revealed the formation of nanoblends as the nanoclay was intercalated and exfoliated.

Keywords: *Polymer nanocomposites, Nanoclays, Mechanical properties, Melt processing, XR diffraction.*

Corresponding author's: kouinib@univ-boumerdes.dz
sciencesconf.org:ncmm2023: T01-2023031

OPTIMIZATION OF CONTACT SURFACES IN SHRINK-FIT ASSEMBLIES OF THIN-WALLED CYLINDERS

Allal Bedlaoui1*, Hamid Boutoutaou1 and Fadila Guerrache1

1Laboratory of Energy, Mechanical and Engineering, Faculty of Technology, University of M'hamed Bougara, Independance Avenue, 35000 Boumerdes, Algeria.

Abstract

The shrink-fit assembly is one of the most important mechanical assemblies and it has been used for several years, because it is economical as it needs only two components, an axis and an axle, as the outer diameter of the axis is greater than the inner diameter of the hub and the Which means that there is an interference, which is the difference between them. The shrink-fit assembly is used in several fields such as the manufacture of Aircraft, cars, connecting oil and gas pipelines,...etc. Assembly is achieved either by heating the hub, cooling the axis, or by force. When assembling, contact pressure is formed on the contact area between the axis and the hub. Usually the contact area is considered perfect, but in fact it contains defects that vary in capacity and number. In this article, we study the role of the form defect and interference in the 3D assembly by studying its effect on the extraction force and assembly coherence, with use a numerical simulation to ascertain in that. Component separation experiment was applied to validate the simulation results.

Keywords: *Radial stress, Hoop stress, Strain, Interference, Shrink-fit, Form defect.*

Corresponding author's: a.bedlaoui@univ-boumerdes.dz
sciencesconf.org:ncmm2023: T02-2023045

CHARACTERIZATION OF ALGERIAN PHOSPHATE MARLES REJECTS OF DJEBEL ONK TEBESSA

LAALA Imen, BOUZIDI Nedjima, BOUZERIBA Hadjer

University of A. Mira Bejaia Laboratory of Materials Technology and Process Engineering (LTMGP), University of Bejaia, Algeria,

Abstract

The phosphate ore production is steadily increasing due to its high demand for agriculture, medicine, and others. Ore extraction generates a considerable quantity of waste rocks that are generally stocked in piles. Marls present high volume of phosphate waste rocks that are chemically inert, but their disposal creates diverse environmental issues. The current research aims to investigate the characterization of phosphate mine waste rocks generated from Djebel Onk mine site. Several techniques were used such as XRF, X-Ray diffraction and SEM to identify the major and minor phases as well as trace elements exciting in this reject. According the XRD patterns of raw marl (RM), it shows a high percentage of dolomite phase (CaMg (CO3)2), Anorthite-sodian-ordered, while hydroxyapatite $Ca_{10}(PO_4)_6(OH)_2$ and fluorapatite Ca5(PO4)3F are present in low amount. According to the SEM results, the figure showed the spherical shaped particles with clumped distributions mentioning to the existence of Hydroxyapatites and fluorapatite, rhombic dolomite crystals confirming the presence of dolomite and anorthite in accordance with XRD results. Thus, the results carried out by X-Ray Fluorescence (XRF) reveal that the reject chemical composition contain large amounts of CaO, P2O5 and MgO, asSiO2 is about 4.3 (wt.%); Fe, Ni, Zn, Ti and sulfurs are trace elements standing in low proportions.

Keywords: *Djebel-Onk mine; Mining wastes; Phosphate marls; Environment.*

Corresponding author's: imen.laala@univ-bejaia.dz
sciencesconf.org:ncmm2023: T01-2023176

CHARACTERIZATION OF MARL REJECTS FROM EXPLOITATION OF EL -OUENZA IRON MINE

BOUZERIBA, Hadjer 1. BOUZIDI, Nedjima 1 . IDRES, Abdelaziz 2 . LAALA, Imen 1

University of A. Mira Bejaia Laboratory of Materials Technology and Process Engineering (LTMGP), University of Bejaia, Algeria,

Abstract

The main objective of this study is to characterize the release of marl from the exploitation of iron ore from El-Ouenza, the latter is the main supplier of hematitic iron ore to the el Hadjar steel complex. But it generates large quantities of waste consisting mainly of waste rocks, poor iron ore, limestone and marl stored in the open air. Depending on local climatic conditions, the physico-chemical and mineralogical nature of the discharges having a negative impact on the environment, human health, atmospheric pollution and landscape degradation. An in-depth physicochemical, mineralogical and thermal characterization (FRX, DRX, SEM and ATG/DSC) is carried out on representative samples taken from the site. Its main composition is slice, hematite and alumina as well as other oxides in small percentages. X-ray diffraction analysis shows that the marl sample is mainly made up of quartz, calcite, muscovite and goethite. From the microscopic observation of the sample, the result revealed that the marl is made up of various mineral crystals. The analysis of this sample revealed a dominance of quartz, a minor presence of iron and traces of calcite. The ATG/DSC curve of the marl sample shows four mass losses. According to these results, iron ore rejects mainly contain quartz, hematite and alumina.

Keywords: *El-Ouenza mine, characterization, marl rejects, environment.*

Corresponding author's: hadjer.bouzeriba@univ-bejaia.dz
sciencesconf.org:ncmm2023: T01-2023004

Faculty of Technology, M'Hamad Bougara University of Boumerdes, Algeria

2 nd CNMM-2023