Mechanics, Simulation and Control III

Selected, peer reviewed papers from the 2013 International Conference on Mechanics, Simulation and Control (ICMSC 2013)

Applied Mechanics and Materials Volume 367

Kanyakumari, India 22 – 23 June 2013

Editors:

K. M. Gupta

ISBN: 978-1-62993-338-2 ISSN: 1660-9336 Printed from e-media with permission by:

Curran Associates, Inc. 57 Morehouse Lane Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2013) by Trans Tech Publications Ltd. All rights reserved.

Printed by Curran Associates, Inc. (2013)

For permission requests, please contact Trans Tech Publications Ltd. at the address below.

Trans Tech Publications Ltd. Laubisrutisr 24 CH-8712 Stafa-Zuerich Switzerland

Fax: +41 (44) 922 10 33 Fax: +1 (603) 632-5611 e-mail: sales@ttp.net

Additional copies of this publication are available from:

Curran Associates, Inc. 57 Morehouse Lane Red Hook, NY 12571 USA Phone: 845-758-0400 Fax: 845-758-2634 Email: curran@proceedings.com Web: www.proceedings.com

Table of Contents

Preface and Committees

Chapter 1: Advanced Materials Engineering and Technologies

Investigation of Electrohydrodynamic Patterning of Micro Structures at Room Temperature	
X. Li, Y.C. Ding, J.Y. Shao and H.Z. Liu	3
<i>In Situ</i> Polymerization of Polyaniline/Viscose Fiber B. Zhou, N. Wang, X.X. Zhang, Y.P. Wang, J.C. Xiong and X. Yan	7
Hard Template Synthesis of Mesoporous and Nanocrystalline Alkali Metal Niobates with Enhanced Photocatalytic Performance O. Li, L.Y. Wang and X.K. Li	12
Effect of Sulfur and Chlorine on the Speciation of Mercury in Coal J. Ding, L. Liu, Q.C. Liu, J. Yang, W. Gao and M. Kong	16
Study of Hydrothermal Synthesis of Analcime J. Zhu, L.Y. Zhou and Y.L. Yang	22
Phase Transition Behaviors and Thermal Conductivity of Ge Doped Sb ₂ Te Thin Films for Phase Change Random Access Memory S.Y. Bai, Z.N. Tang, Z.X. Huang and Y.F. Gu	26
Influence of the Gas Environment on the Transfered Film of the Tribologic Brass (CuZn)/XC48 Steel COUPLE M. Amirat, M. Sawalem and H. Zaïdi	32
Artificial Neural Network Model: Prediction of Mechanical Properties in Beta-Titanium Biomaterial K.V. Sudhakar and M.E. Haque	40
Adsorption Kinetics of Pb ²⁺ Ions Using Chitosan Nanoparticles Y. Hong, Z.H. Zhong and Y.S. Liu	45
Synthesis Na-Y Zeolite by Hydrothermal J. Zhu and L.Y. Zhou	50

Chapter 2: Mechanical Engineering and Design, Applied Mechanics

Numerical Simulation of Turbulent Transport and Structures in Temporally Developing Plane Mixing Layers T. Natarajan	57
The Effect of Cusp Contact in the Meshing Process for Internal Gear Pairs with few Teeth Difference Y.G. Wei and J. Zhao	63
Dynamic Stability and Natural Frequency of Composite Corrugated Bellows Expansion Joint	(0
N.S. Rao, M. Radhakrishna and A. Prasad Finite Element Analysis of the Material Properties' Influence on Tire/Road Contact Pressure and Area V.S. Wong, Z.B. Cui and O. Liu	68 73
Y.S. Wang, Z.B. Cui and Q. Liu Formalism for Determining the Force and Torque on a Sphere Moving in a Quiescent Fluid at Arbitrary Reynolds Numbers S.N.S.H. Chittajallu, T.R. Ramamohan and K.R. Thundil	73
Finite Element Investigation of Stress Intensity Factors of Multiple Semi-Elliptical Surface Cracks in Solid Shaft A.R. Bedare and S. Bhat	84
Parametric Studies on Weld Penetration on Plate of Aluminium Alloy 6061-T6 Using FEM Simulation A.M. Sajeeb	90

Design of Fault Tolerant Control Laws for Jet Engines R.F. Sneha and J.S. Mija	96
Design Maps and Shape Optimization of a Prototype Vehicle Chassis M.R. Murshed, B. Ud Duja, S.I. Ranganathan and B.M. Darras	101
Elasticity Based Stress Analysis under Arbitrary Load using Fourier Series L.K. Patil and S. Bhat	106
Modelling of Multi-Axial Ultimate Elastic Wall Stress (UEWS) Test for Glass Fibre Reinforced Epoxy (GRE) Composite Pipes M.S.A. Majid, M. Afendi, R. Daud, N.A.M. Amin, A. Mohamad, E.M. Cheng and A.G. Gibson	113
Modeling and Simulation of Dynamic Property of Vehicle Frame Based on Finite Element Method S.L. Kong	118
The Finite Element Analysis of New Forged Coupler Knuckle G.X. Wang, X.S. Bu, L.J. Li and L.L. Zhu	122
A Transform Free Higher Order Compact Finite Difference Scheme for Simulating the Flow behind a Rotationally Oscillating Circular Cylinder at Reynolds Number 500 H.V.R. Mittal and R.K. Ray	126
Kinematic Simulation of a Novel RV-Planet Gear Drive with Small Teeth Difference Used in Wind Turbine Y.G. Wei and J. Zhao	132
The Edge Effect and Longitudinal Modification of Involute Gear Drive Used in Automobile Y.G. Wei and W.C. Tang	136
Finite Element Analysis of the Roller Bearing Used in Rolling Mill Y.G. Wei and Y.K. Liu	141
Topology Optimization for the Light Rail Vehicle Body Based on Sub-Structure Technology J.L. Cao, J.Y. Li and C.Y. Wan	145
Green Design for Concurrent Engineering in Agriculture Machinery J.W. Yu	151
Finite Element Formulation for the Vibration Analysis of Couple-Stress Continuum W.Z. Su	156
Design of CPM Training Machine of Recovery for Knee Joints L.L. Zhu, G.X. Wang and D. Li	161
Failure and Plasticity Conditions of Concrete in the Finite Element Analysis O. Sucharda and J. Brozovsky	165

Chapter 3: Electrical Engineering and Electric Machines

Adjustable Speed Drives Response to Voltage Sags S. Hardi, M. Hafizi and R. Ismail	171
Research and Implementation of Single Switch Voltage Clamped Hybrid DC-DC Converter Z. Chao, Z. Qiang, X. Lei and H.X. Ning	181
Performance Comparison between PID Controller and State-Feedback Controller with Integral Action in Position Control of DC Motor A. Chowdhury and D. Debnath	188
Analysis of the Nonrecursive Advanced Optimal Control of the Permanent Magnet Synchronous Motor Drive M. Gaiceanu and E. Rosu	194
Simulation and Analysis of Seven Switch Nine-Level Hybrid Cascaded Inverter for Fuel Cell Applications S.R. Thilaga and S.S. Kumar	199
Simulation of Contact Bouncing Behavior in Starter Solenoid and Exploring Potential Feasible Solution N. Nithesh, C. Bhat, P. Rao, J. Christopher, F. Saldanha and P. Shenoy	204

Chapter 4: Power System and Electronics, Energy Engineering, its Applications

Prepayment Electric Energy Meter with Multi-Functional for Multi-User Based on STC11F52XE	
W. Sun and J.Z. Tuo	211
Study on Neutral Grounding Mode of Generator in III Nuclear Power of AP1000 Z.B. Xiong, G. Su, X.F. Zhang and X.M. Yu	216
Investigation of Energy Deposition Technique for Drag Reduction at Hypersonic Speeds J. Bibin and K. Vinayak	222
Experimental Investigation of PCM Spheres in Thermal Energy Storage System N.A.M. Amin, A. Mohamad, M.S.A. Majid, M. Afendi, F. Bruno and M. Belusko	228
A Practical Design Method of Flyback Switching Power Supply Transformer D.P. Zhou and Y.X. Chen	234
Design of FPGA Debugging Interface Based on EZ-USB Slave FIFO L. Li	240
Hardware Testable Design of Genetic Algorithm for VLSI Circuits N. Rajeswaran, T. Madhu and M. Suryakalavathi	245

Chapter 5: Instrumentation, Measurement Technologies, Analysis and Methodology

Statistical Inference for Zero-Inflated Poisson Regression Models with Excess Zeros L. Dai and Y.Z. Fu	253
Online Surface Settlement Monitoring System of Ballastless Track with Difference Image	
Style Y.Z. Min, J.W. Dang and Z.H. Zhang	259
Controllability Property of a Superlinear Climate System L. Zhang and Y. Liu	264
Effects on Satellite Formation Flying of Tiny Aspherical Gravitation of the Earth G.Y. Xu and J.F. Luo	270
A Multiscale Finite Element Simulation of Human Aortic Heart Valve S. Shahi and S. Mohammadi	275
High Accuracy DEM Reconstruction Using SAR Clinometry and Interferometry Method J.G. Hou and Y. Chu	280
Self-Adaptation of Natural-Coordinate System K.W. Zhang and Y.Q. Zhang	286
Study on Plant Water Stress Based on Ultrasonic Acoustic Emissions J.X. Wang, X.W. Gao, M.L. Sui and X.Y. Li	292
Light Capacitance Type Refractometer to Measure Atmosphere Parameter T. Guo and Z.P. Liu	297
The Perturbation Method for Stability Analysis of Uncertain Structures C.R. Ji and Z. Ni	302
Design of Highway Construction Mixing Materials Ratio Based on Genetic Algorithm L.P. Li, G.L. Xu and X.L. Lu	308
Numerical Method of Control Object Identification and Models Robustness Property	
Maintenance V. Goncharov, A. Liepinsh and V. Rudnitskiy	312
Modeling of Melatonin Behavior in Major Depression: A Fuzzy Logic Modeling A. Azizi, K.G. Osgouie, S. Rashidnejhad and M. Cheragh	317
The Analysis of the Deep Sea Geomagnetic Measurement Platform Rotation's Impact on the Measurement Results	
D. Wang, C. Chi and W.Z. Chen	322
Research on Carbon Emission Measurement of Electricity Sector Based on Scenario Analysis Method Y.S. Huang and J. Xu	327
Research on Carbon Emissions Measurement of Coal-Energy Chain Based on Life-Cycle	521
Assessment Method J. Xu	333

An In-Flight Emergency Alignment Scheme for Aircraft MINS with Assistant of Airborne SAR	
Y. Yao, S. Pan and G. Chao	339
Application of Mathematical Programming Method for Water Supply and Recycle Network	
in Titanium Pigment X.J. Mi, J.C. Xu, J.W. Huang, L. Luo, Y.L. Liang and G.M. Li	347

Chapter 6: Modern Control, Automation and Robotic Engineering

Application of Sliding Mode Control for Wind Power Generation System Z.Y. Zhao and W. Wang	353
Fuzzy Logic Based Active Vibration Controller A. Sharma, C.K. Susheel, R. Kumar and V.S. Chauhan	357
Enhanced Model Reference Adaptive Control Using Smith Predictor R. Karthikeyan, C. Bhargav, K. Koneru, G. Syam and S. Tripathi	363
Fuzzy Logic Based Set-Point Weighting for Fractional Order PID Control R. Karthikeyan, S. Pasam, S. Sudheer and V. Teja	369
Simulation of Trajectory Correction for an Impulse Control Mortar Projectile with a Strapdown Laser Seeker X.B. Cao, Y.C. Xu, C.Y. Rui and Z.Y. Shan	377
State Space Analysis and Optimal Control for Aircraft Simulator Pitch Electric Control Loading System	
C.P. Pan, L.X. Li and Y.L. Wang	382
Intelligent Mobile Robot Navigation in an Uncertain Dynamic Environment A. Azizi, F. Entesari, K.G. Osgouie and M. Cheragh	388
Variable Step Perturbation MPPT Method Based on Fuzzy Control for Wind Power Generation System	
Y.Q. Dong and W. Wang	393
An Optimal MPPT Algorithm for Wind Turbine Based on Fuzzy Control H.L. Wang and W. Wang	397
Design of Multi-Mode Microwave Control Combination for InSAR System Y. Yuan, X.Q. Yan and Z.L. Cao	401
The Designment and Implenment of Fuzzy Hybrid Pid in Srm Appleller to Electric Valve G.Q. Li, D. Zhao and H. Jiang	405
Elastic Formation Keeping Control of Unmanned Aerial Vehicle Adapting to Flight Speed G.Y. Xu and Y.B. Shi	411
Industrial Automation Using Wireless Mesh Network M. Thangaraja, K.S. Manic and S. Uma	417
Exoskeleton Robot Walking on Slope Terrain Y. Chen, R.H. Li and J.W. Liu	422
Design and Fuzzy Compensation Control for Reduction Cell Monitor Manipulator with Adaptive Law W. Wang	427
Chapter 7: Manufacturing and Industrial Engineering, Management Applications	

A Vehicle Rollover Warning Approach Based on Neural Network and Support Vector	
Machine	
X.P. Du, L.T. Lu, H.M. Sun, Y. Li and J.J. Song	433
LOPN-Based BPR of Container Terminal Production Controlling System	
W.Z. Zhong, X.Q. Fu and Y.P. Wang	441
Simulation and Visual Operation: IT Application on Container Terminal Production	
Logistics System	
W.Z. Zhong, L.L. Xi and Y.P. Wang	447

Application of Fuzzy Analytic Hierarchy Process in Selection of Electrical Heat Tracing Elements in Oil Pipelines X.G. Zhao, Y. Zhou and J.Y. Zhao	452
Application of Differential Evolution Wavelet Neural Networks for State Recognition of	
Tool Wear X.Y. Wang	457
Numerical Analysis of Multi-Layer Continuous Diffusion Furnace Door Gas Curtain S.C. Zhang, G.Q. Li, L.X. Lu, P. Mitrouchev and C.G. Wang	462
Modeling the Machining Parameters of Micro Wire Electrical Discharge Machining of AL 2024 T351	
P. Sivaprakasam and P. Hariharan	466

Chapter 8: Information Technologies, Communication and Networks Engineering

The Construction of Electronic Laboratory Based on Combining Virtual Environment and Hardware Environment	
X.P. Deng and S.M. Xu	473
A Neural Network Model for Phoneme Generation M. Crisan	478
Study on Efficiency of the Search Engine Spiders Crawl the Page J.J. Lin	484
Study on Real-Time Dynamic Effects in the Search Engine J.J. Lin	489
An Analysis of Impacts of Computer Network on Marketing of Furniture Enterprises Q.M. Zhang and W.M. Zhang	495
Design of A Filtering Algorithm Based on FOG SINS /GPS/DR K. Zhang, J.Q. Bai and B.L. Gu	499
Analytic Solution to a Virus Infection Model L. Xu and S. Xu	503
Research on Reginal Agricultural Information Technology System Construction - Take Shandong Province as Example Z.X. Zhou	508
A Study on Grid-Based Geography Visualization Environment H. Chai and J.Y. Huo	513
Design of Locomotive Network Test Platform Based on WorldFIP K. Zhao, Y.J. Ju and B.J. Chen	518
Design of Interactive Virtual Laboratory Based on VRML Technology J.G. Yuan and R.N. Xing	523
Application of Extended Kalman Filter Algorithm in SDINS/GPS Integrated Inertial Navigation System O.A. Awin	528
Energy-Aware Chaotic Communication in Wireless Sensor Network R. Dutta, S. Gupta and M.K. Das	536
A Design of High Speed Data Acquisition and Storage System Y.P. Li	541