

Advanced Development in Automation, Materials and Manufacturing

Selected, peer reviewed papers from the 2014 International Conference on Mechatronics, Materials and Manufacturing (ICMMM 2014), August 2-4, 2014, Chengdu, China

von
Li Qiang

1. Auflage

Trans Tech Publications 2014

Verlag C.H. Beck im Internet:
www.beck.de
ISBN 978 3 03835 225 9

Table of Contents

Preface, Committees and Sponsors

Chapter 1: Advanced Materials Engineering and Processing Technologies

Extraction of Aluminum from High Iron Bauxite by Carbothermal Reduction-Ammonium Sulfate Roasting J.Y. Jin, Z.Y. Li and Y. Wu	3
Effects of PMN Volume Fraction on the Damping Properties of 1-3 Piezoelectric Damping Composites X.J. Guo, J.S. Zhang, D.Y. Xu, X.C. Xie, F. Sha and S.F. Huang	8
Experimental Study on the Lateral Compression and Energy Absorption Characteristic of Steel Tube Filled with Polyurethane Foam Z.P. Zhou, Y.Q. Qin, F. Liu and Y.M. Wang	13
Research on the Anti-Penetration Performance of Aluminum Foam Sandwich Plate G.Y. Hang, W.L. Yu, T. Wang, J.T. Wang and Z. Li	20
Acoustic and Thermal Properties of Polymer Composites Reinforced with Lignocellulosic Fibers E. Jayamani, S. Hamdan, P. Ezhumalai and K.H. Soon	25
Synthesis of ZnO Microspheres with Different Morphologies and their Comparison of Gas Sensing Performance M.L. Yin and X.H. Fan	30
Synthesis and Characterization of Epoxy Resin Reinforced with Luffa Fiber Composites for Sound Absorption E. Jayamani, S. Hamdan and M.R. Rahman	36
Advanced Ceramics: Some Challenges and Solutions in Machining by Conventional Methods A. Gorin and M.M. Reddy	42
Crystallization of Aluminium Alloys S. Gaspar, J. Pasko and J. Majernik	48
Influence of the Amount of Recyclate and Regranulate Senosan on Tensile Properties of the Material Starex J. Majernik, J. Pasko and S. Gaspar	52
Strain Rate Effect on the Mechanical Properties of Recycled Wood Particles/ Epoxy Composites E. Jayamani, S. Hamdan, N.S. Ee, T.Y. Siang and D.L.T. Yang	57
Perceived Roughness of Material Surfaces J. Liu, X.X. Cai, J.Y. Dong and X.Q. Ning	62
Study on Gel Time for Electrorheological Materials Applied to ER Automatic Clutch Y.C. Wang, M. Wang and J.H. Wang	67
A Study on the Phenomenological Constitutive Model of Mg-12Gd-5Y-3Zn-0.6Zr Magnesium Alloy Forming at Elevated Temperature G. Lu, Z.M. Zhang, Y. Xue and B.C. Li	71
Electrochemical Corrosion Behavior of AZ80 Magnesium Alloy Tube Fabricated by Hydrostatic Extrusion Z.L. Wu, D.X. Wu, R.S. Yuan, L. Zhao and Y.B. Zhao	77
Research on Affecting Factor of Preparation of Calcium Sulfate Whisker with FGD Gypsum Y. Wang, D.J. Tan, X. Li, F. Li, P.Q. Wang, J. Yang and L. He	82
Research Status of Flexible Substrate Transparent Conductive P. He, B.L. Zhai and J. Qiu	86
Effect of Quenching Temperature and Medium on Properties of TiO₂ Nanotube Arrays in DSSC C.X. Zhang, Z.G. Bao and H.J. Tao	91

Affect of Interactions between FM/AFM in $\text{La}_{5/8}\text{Ca}_{3/8}\text{Mn}_{1-x}\text{Co}_x\text{O}_3$ System on the Magnetic Properties	
S.J. Cheng and K. Yao	97
Evaluation of Interface Performance by Means of Dynamic Electrochemical Impedance Spectroscopy	
Y.L. Lv, S.H. Zhang and Y. Tan	102
Interface Characterization and Materials Flow Pattern Analysis for Friction Stir Welding Overlap Joints of Mg/Al Dissimilar Alloys	
Y.H. Jin, Z.Y. Huang and C.F. Li	106
Characterization of Fe_2O_3-CaO-SiO₂ Glass Ceramics Prepared by Sol-Gel	
Y.Y. Wang, B. Li and Y.Y. Wang	114
The Chemical Compositions and Origin Characters of Serpentine Jade from Different Deposits	
Q. Chen, Y.Y. Wang and F.X. Gan	119
Effect of Wire Materials on Cutting Performance of WEDM for Machining of Inconel Superalloy	
R.K. Garg, V. Aggarwal and S. Singh	124
Growth of Rutile TiO_2 Nanorods by Chemical Bath Deposition Method on Silicon Substrate at Different Annealing Temperature	
A.M. Selman and Z. Hassan	129
A Study on Effect of Beginning V Concentration in TD Process	
S.N. Li, H. Chen, Y.J. Zhang, Z.Y. Gao, L.Z. Liu, B. Ma and L.N. Yu	134
Experimental and Numerical Simulation of Multipass Hot-Rolling on 7150 Aluminum Alloy	
J. Li	138
Performance Study Analysis of Inflaming Retarding Viscose of Clothing Material	
Y.G. Chen	143
Investigation of the Corrosion Mechanism of A3 Steel by Ammonia Nitrogen Metabolites of <i>Crassostrea Rivularis</i>	
C.X. Cai, Y.Z. Yin, J.M. Li, S.M. Zhong, X.F. Wu and Y.S. Nong	147
Research Progress of W/ZrC Ultra-High Temperature Cermets	
Y.P. Yu, S. Wang and W. Li	152
Exchange Bias of the $\text{Fe}/\text{Fe}_3\text{O}_4$ Coated Ag/Hollow Glass Microspheres	
A. Li, T.H. Wang, D. Wang and J.G. Bi	157
Fluorine Doping Effects on the Electric Property of BiFeO_3 Thin Films	
F.L. Xu, P.J. Zhao, J.Q. Zhang and X.Q. Xiong	161
Research on the Influence Factor and Improving Measures of Machining Accuracy	
L. Hu and J.F. Wang	165
Electrical and Magnetic Properties of Multiferroic BiFeO_3 Ceramics Prepared Using Sol-Gel Derived Fine Powders	
F. Chen and Y.J. Qi	169
Effect of Co-Solvent on the Solubility of Ginger Bioactive Compounds in Water Using COSMO-RS Calculations	
S.Z.S. Jaapar, Y. Iwai and N.A. Morad	174

Chapter 2: General Mechanical Engineering and Applied Mechanics

Kinematic Optimization of Transplanting Mechanism with B-Spline Curve Gear for Rice Pot Seedling Based on Matlab	
Y.J. Zuo, X.X. Yu, W.G. Li, H.X. Zhu and H.P. Ji	181
Creep Analysis of Combined Bolted Flange Joints under High Temperature	
H.H. Wang and Y. Zhang	187
Numerical Study of the Effects of Joint Interface on Two Cylinders	
L.L. Zhang, X.Y. Li, R. Chen and Y.J. Zeng	193
Analysis of Microstructures and Mechanical Properties of Two Hot Dip Galvanized Dual-Phase Steels with Different Alloy Systems	
S. Kuang, X.M. Qi and Y. Han	198
Torque Analysis and Simulation Calculation of Flying Fixed Canard	
K.C. Zhang, X.B. Gao and H.N. Le	202

Design of Space Sliding Rails and Mechanical Analysis F.P. Liu, J.Z. Shang, Z.R. Luo, T. Zhang and N.H. Yu	207
Eulerian Description of Rail Straightening Process T. Návrat and J. Petruska	213
Review of Pressurized Vessel Structural Design – An Assessment of Total Life P. Vosynek, M. Vlček and T. Návrat	218
Structure Design and Flow Field Simulation of Magnetic Liquid Suspension Centrifugal Blood Pump H.C. Wu, Z.Y. Zhang, P. Chen and Y.W. Ren	223
Experimental Study on Cross Section Lateral Compression Energy Absorption Characteristics of Three Types of Steel Tubes Z.P. Zhou, Q. Fang, F. Li, X.H. Zhu and Y.M. Wang	228
Aerodynamic Characteristic Analysis of Two-Dimensional Trajectory Corrector Projectile in Mortar T. Zhang, X.L. Zhao and Z.D. Song	236
Static and Dynamic Analysis of Annular Sector Plates Subjected to Arbitrary Boundary Conditions K.P. Zhang, C. Yang and H. Wu	240
The Quantum Conditions of One Dimension Potential Well Based on WKB Approximation Method W.L. Yu and H.Q. Du	245
The Simulation Research of Tool Wear in Small Hole EDM Machining on Titanium Alloy Y. Liu, W.C. Zhang, S.F. Zhang and Z.H. Sha	249
Multiaxial Fatigue Life Prediction of the CII Platform Leg Based on Critical Plane Energy Method J.H. Lu, M.B. Wei and K.Y. Zheng	255
Numerical Study of Marangoni Convection around a Single Vapor Bubble during Pool Boiling C.L. Xu, Y.C. Shi, X.X. Jin, Z.S. Lei, Y.B. Zhong and J.H. Guo	262
The Buckling Mechanism of Square Tube Subjected to the Impact of a Mass Z.H. Tan, B. Zhang and P.C. Zhai	267
Structural Design and Finite-Element Analysis of Packing Seal with Self-Adaption and Resilience P. Liu, T. Zeng, J.K. Xie and F.J. Qi	272
Numerical Analysis on Droplet Deformation and Breakup in High Gravity Field J.D. Li, D.J. Zuo and Y.T. Zhang	276
Experiment Verification of Equivalent Model for Vibration Analysis of Honeycomb Sandwich Structure X.Q. Zhao, G. Wang and D.L. Yu	280
Flow Mechanism and Hydrodynamic Characteristics of 3D Cavity on the Surface of the Underwater Vehicle B.Z. Li and Y. Wang	285
Vehicle Dynamics Modeling Based on Vortex T. Jin, Y.Q. Gong and C.Y. Wei	289
Theoretical and Numerical Analysis on the Static-Loaded Contact Pressure of Mechanical Elastic Wheel X.L. Li, Y.Q. Zhao and M.J. Zhang	293
Shock Absorber Using Hydraulic System and Shape Memory Alloys K. Zhang and Z.P. Tang	298
Experimental Modal Analysis of a First Stage Blade in ALSTOM Gas Turbine A. Rahmani, A. Ghanbari and A. Mohammadi	303
Load Analysis and Structure Design of Small-Scale Maglev Wind Turbine M.X. Liu, Y.F. Hu, R.H. Dong, S.M. Peng and H.C. Wu	308

Chapter 3: Instrumentation, Measurement Technologies, Analysis and Methodology

Thermal Lens Microscopy: Characterization and Optimization M.Q. Liu and M. Franko	317
Effect of Scanning Depth of Field on the Measurement Noises of Developed Fringe Projection 3D Scanning System H. Rashidizad and A. Rahimi	322
Analysis of Spindle Rotary Precision Based on Two-Point Methods F. Lu, H.B. Shen, X.F. Zhang, L.X. Zhang, Y.H. Wu and K. Zhang	327
Experiment of a Flat Plate Solar Water Heater Collector with Modified Design and Thermal Performance Analysis S. Hossain, A.W. Abbas, J. Selvaraj, F. Ahmed and N.B.A. Rahim	332
Determining the Exact Value of the Shape Deviations of the Experimental Measurements J. Mascenik and S. Pavlenko	339
SAR Image Recognition via Local Gradient Ratio Pattern X. Yuan, T. Tang, D.L. Xiang and Y. Su	344
The Research on Underground Millimeter-Wave Detection System M.X. Ma, H.Y. Liu and Q. Shao	348
Design of LIDR Monitoring System Based on GPRS L.M. Ding, Z.Y. Zhang, J.D. Mao and H.J. Sheng	352
The Method to Calculate the Length of the Catenary for Anchored Vessel J.B. Li, G.B. Zhu and Z.S. Ou	356
Characteristic of Low Calorific Fuel Gas Combustion in Porous Burner by Preheating Air M.H. Fan, G.Q. Wang, D. Luo, R.Z. Li, N. Ding and J.R. Xu	361
Failure Prediction Analysis on the 172 Basic Plane Based on Grey Theory L.Q. Li and H. Zhao	366

Chapter 4: Electrical Engineering and Designing of Circuits

Research on Teaching Aid of Analog Circuits Based on Magnetic Element W.L. Zeng	373
Design of Fitness Device with Power Generation and Multi-Function H.F. Qiu, J.W. He and L. Gu	377
Identification of Coefficient of Self Inductance H.Q. Du, P.J. Wang, Z.H. Ling and Z.X. Wang	381
The Design of Multiplier in Integrated Circuit Based on Low-Power Algorithm D. Zhou	385
Design Methodology of ALU Based on Resource-Sharing D.R. Gao and Y.R. Geng	389
Reliability Analysis and Optimization of Constant Current Remote Power Feeding System of Seafloor Observatory Network C. Fan, X.J. Zhou and X.C. Wang	393
Study on Access System of Low Voltage Distributed Photovoltaic Power Station N. Liu, H.M. Wang, T. Song and J.H. Sun	397
Research on the Design Method of Self-Repairing Digital Integrated Circuit Based on Embryonic Cellular Array D. Zhou	401
Research on Human Implantable Wireless Energy Transfer System Z.Z. Peng and B. Yin	405
Research of Novel Phosphor Membrane Packaging Technology for LED Illuminant R.H. Liu, C. Liang and S.Y. Li	410

Chapter 5: Mechatronics, Control and Automation of Manufacturing

Modeling and Simulation of Omni-Directional Mobile Robot with Mecanum Wheel X.X. Wu, X.L. Zhang, H.D. Zhou and W.S. Chou	417
Neural Network Solutions for Forward Kinematics Analysis of 2-(6UPS) Manipulator A. Rahmani and A. Ghanbari	424

The Research for Control of the Laser Beam Trajectory on Surface Hardening Using NC Q.L. Zhang, Y.L. Jin and M.Z. Wang	429
Design of Control System for Knuckle Boom Crane K. Song and Y.F. Xue	433
Design of Map Positioning and Navigation System Based on Mobile Platform Q.P. Liu and Q. Liu	439
Injection Speed Control of Precision Injection Molding Based on CMAC Neural Network K.Y. Chen, M.X. Yan, Y. Wang and N.Q. Zhou	444
Structure and Control on FSM Subsystem in Precision Tracking G.H. Wu, H. Li, J.X. Li and Y.H. Wang	449
Study on Optimal Method for PID Parameter Based on Artificial Bee Colony Algorithm G.C. Li, P. Yan and S.E. Wang	454
A Study on Nonlinear Decoupling Controller for UPFC Z.B. Chen, Y. Ma and B.W. Su	460
Research of Constant Pressure Water Supply System Based on PLC M.F. Wan	465
Research on Artificial Intelligence Technology of Electrical Automation Control G.Q. Wang	469
Research on Modeling Methods of Nonlinear Black Box K. Wang	473
Survey and Forecast on Scheduling of Networked Control System Y. Pan	477
Research of BD/GPS Hybrid Positioning Module Based on ARM and GPRS Y. Huai, Q.L. Shao and S.J. Wang	481
Research on the Electronic System Design of the Automobile Based on PLC and MPC Y. Chen, Q. Tao and H. Wang	485
Design of Reverse Sensor Based on Solar Power Z. Xu	489

Chapter 6: Communication, Processing of Signal and Data, Information Technologies

The Voice Activity Detection Algorithm Based on Spectral Entropy and High-Order Statistics Q. Li, H.E. Xie and Q.J. Zheng	495
Testing Based on Empirical Likelihood for Partially Linear Models with Instrumental Variables P.X. Zhao	500
Modeling Based on Combinatorial Optimization Multi-Target Data Association and Bonic Algorithm X. Fu	505
Comparative Analysis of Determinant Elimination Method, Ant Colony Algorithms and Genetic Algorithm X. Fu	509
Shuffled Frog Leaping Applied to Optimal Deployment of Radar Network Y.J. Cui, H. Cha and H. Shen	512
Cultural Shuffled Frog Leaping Algorithm and its Applications for the Radar Network Deployment Y.J. Cui, H. Cha and B. Tian	516
Research on Path Optimization of Urban Traffic Guidance System D.P. Wang and K.Y. Hu	520
The Research of Model-Driven Architecture in the Embedded System J. Huang	524
Application and Research of Weighted Wireless Network Node Load Evaluation Method Based on Network Contribution Degree G.B. Yu and S.C. Li	528

Research on Routing Protocol for Wireless Sensor Network Y. Zhang and H. Pan	532
Fuzzy C-Means Image Segmentation Algorithm Based on Chaotic Simulated Annealing Q. Yang, Z.Q. Wang and Y. Xu	536
Virtual Training System of Special Equipment Operation Based on Virtools B. Deng and L.W. Liu	540
The Minimum Weight Dominating Set Problem under Hybrid Uncertain Environments C.Y. Wang, D.L. Luo, M.W. Zeng, Y. Yi and X.C. Zhou	545
The Optimization of Association Rule Algorithm in Data Mining Y. Fan	549
Research on Distributed Heterogeneous Data Storage Algorithm in Cloud Computing Data Center J.B. Yang, S. Huang and P. Jiang	553
Study on Path Optimization Method of Urban Traffic Flow Guidance System Based on Internet of Things D.P. Wang and K.Y. Hu	557
Design of Infrared Communication System Based on Phase-Locked Loop Frequency Modulation J. Wang and S. Feng	561
Study on Path Optimization Method of Traffic Guidance System under the Condition of the Car Networking D.P. Wang and K.Y. Hu	567
Chapter 7: New Technologies, Methods and Technique in Resources and Civil Engineering	
The Water Absorption Rule of Vertical Fractured Well Z.G. Wang, G.Y. Zhang, D.K. Zhou, Y.Q. Li and W.P. Song	573
Stability Study on Jointed Rock Mass Affected by Fissure Water Pressure W.Q. Xue, W.S. Zhu, J.W. Fu, C. Jia and S. Guo	577
Study on the Infiltration Rule of Expansive Rock Canal Slope E.P. Zhao, X.B. Jia, Q.F. Liu and X. Yan	582
GPS Application in Ginkgo Landslide Monitoring Z. Wei, F.C. Chen, S.L. Zhan and Y.H. Pan	588
Mechanical Properties Analysis of CFRP Pre-Stressed Section Continuous Thin-Walled Box Girder Bridge Models 22 X.Z. Wang and C.X. Li	592
Study on Cracking Resistance of Concrete Reinforced with Rib Stiffened Steel Plates X.D. Wang, X.D. Zhang, J.Z. Wang and Z.X. Zhou	596
Renewable Energy Sources Used to Supply Pre-School Facilities with Energy in Different Weather Conditions R. Alihodzic, V. Murgul, N. Vatin, E. Aronova, V. Nikolić, M. Tanić and D. Stanković	604
Application of Cubic Spline Interpolation Method for Track Profile Irregularity Adjustment J.Y. Tao and Y.D. Xu	613
Construction Technology for Deep Foundation Pit Support in Mining Area B. Teng	617
Influence of Silt Soil Layer on the Space Seismic Design Response Spectrum C.X. Zhou, S.P. Zheng and Y.Q. Ye	622
The Deflection of Orthotropic Saddle Membrane under the Snow Load H. Zeng, Y.H. Zhang and J. Long	626
Two-Parameter Parabolic Mohr Strength Criterion Applied to Analyze the Results of the Brazilian Test Q. Fan, S.C. Gu, B.N. Wang and R.B. Huang	630
The Co-Existence and Openness of Green Building Design from the Perspective of Complex Science Q.N. Chi	635

Statistical Analysis for Platform Height Ratio of Horizontal Components in Bedrock Seismic Oscillation Velocity Response Spectrum Y.Y. Kong, C. Lian and C. Song	639
Comparative Analysis of Wind Speed in Ventilation Hole Simulated by VOF and Euler Model H.Q. Zhang, X.T. Zhang, Y.L. Lou and W.P. Xing	643
Design of a New Flexometer for the Safety Monitoring System of Bridge H.M. Cao	647
A Novel Fracturing Fluid System with Ultra-Low Concentration and High Temperature Resistant C. Wang, J. Ouyang and Z.Y. Zhu	651
Application of Numerical Simulation Technology in the Large Space Air-Conditioned Buildings J.W. Li and Z.X. Feng	657
Research on Foundation Stability of Building Based on Foundation Bearing Capacity H.R. Pei	661
Research on Innovation of Urban Sewage Treatment System Based on Perspective of Energy Conversion F.F. Zhang, S. Wen and T. Ji	665
Blended Polypropylene Fiber of Various MFR via a Melt-Blowing Device for Oil Spill Cleanup X.H. Meng, H.H. Wu and Y.C. Zeng	669
 Chapter 8: Product Design and Industrial Engineering	
Single Machine Scheduling and due Date Assignment with Past-Sequence-Dependent Delivery Times and General Position-Dependent Processing Times Y.F. Zhao	675
A Theory of Hierarchy-Gray for Purchase Decision Support Systems G.Q. Wang, X.W. Fan, X.N. Wang, H.B. Chen, W. Chen and X.J. Xiong	681
Research on the Key Technology of Manufacturing Services Modeling under Cloud Manufacturing Environments P.Z. Liu, J. Ji, W.Y. Chai and X.C. Zhao	687
A Predicting Model for Demand Quantities of Downstream Manufacturer H.H. Huang	694
Study on Sales System with Demand Affected by Delivery Lead Time C.Y. Tsai, C.Y. Tu and C.Y. Hsieh	698
Accounting Information Systems Development (Subsystems: Production Process in XYZ Ltd) Y. Kurniawan and S.E. Hiererra	702
Design Coal Conveying Simulation System Based on Field Bus Power Plant S.Z. Hu	708
The Optical Fiber Connector Ceramic Insert Core Injection Mold Design P.Y. Ao	712