Mechanical and Electronics Engineering III

PART 2

Selected, peer reviewed papers from the 2011 3rd International Conference on Mechanical and Electronics Engineering (ICMEE 2011), September 23-25, 2011, Hefei, China

Edited by

Han Zhao
Part 2

Numerical Simulation of Particle Mixing Feature for a Gas-Liquid-Solid Three Phase Flow in an Impeller-Driven Stirred Vessel
R.Q. Liang, F.S. Yan, J.H. Ji and J.C. He ................................................................. 869

The Transient Temperature and Thermal Stresses on Metal Material Irradiated by Multi-Pulse Short Power
G.Y. Xu ................................................................................................................... 873

Polymer-Liquid Crystal Composites and Applications
Y.L. Gao, D.L. Zhang, Y.J. Shi and F. Ye ................................................................. 879

Effect of Ta2O5 Addition on the Electrical and Physical Properties of Lead-Free 0.98(Na0.5K0.5)NbO3-0.02(Na0.5Bi0.5)TiO3 Piezoelectric Ceramics
C.H. Wang ............................................................................................................ 883

Reliability Analysis of the Diamond Saw Blades Based on ANSYS
Y.F. Zhang, Z.N. Qi, X.Y. Lang and M. Zhao ....................................................... 887
Tribological Properties of the Overbased Calcium Sulfonate Complex Greases
Z.Z. Wen, Y.Q. Xia and X. Feng ................................................................. 891

Effect of Substrate Temperature on the Preparation of Cu2ZnSnSe4 Thin Films
L. Han, Z.S. Chen, L. Wan and J.Z. Xu ........................................................ 895

Numerical Simulation of Hydroxyapatite Particle Impacting on Ti Substrate in Cold Spraying
L. Zhang, W.T. Zhang and Z.Y. Wu .............................................................. 900

Study Analysis on Purification of Alumina Electrolytic Flue Gas by Bag Filter
J.Q. Wang and F.Y. Kong ........................................................................... 904

Preparation and Characteristics of Multilayer Magnesium Diboride Superconducting Films via CVD Method
S. Wang, Z.Y. Zhou, F.S. Yang, J. Yang and X.H. Fu ..................................... 908

Contact Stresses Analysis between Glass Panel and Upright Fitting Roller Gabled with Different Hyperelastic Materials
L.P. Chao, M.C. Hsiao, I.J. Chen and H.Y. Wu ............................................ 913

Optimal Design of Disc Cutter Structure Parameter Based on Genetic Algorithm
Y.M. Xia, F. Wu, L. Cheng and Z.H. Zhang ................................................ 919

A Method of Machining Micro Hole and Micro Cavity in Ceramics
J.Z. Li, T. Wu and L. Zhang ........................................................................ 923

Influence of Material Microstructure on Micro EDM
J.Z. Li, F.H. Shen and M.G. Gao .................................................................. 927

Temperature Field Analysis on Cooling Stave Material and Stave Body
F. Wei and J. Chang ................................................................................... 931

The Optimal Design of Reinforcement Rib Based on the Orthogonal Test and Finite Element Analysis
L.Y. Su, X.S. Li, X.F. Yin and X.Y. Feng .................................................... 935

Study on Hot Compression of Ti3Al Alloy Based on DEFORM-3D
J. Fan ........................................................................................................ 938

Strengthening Mechanisms of Vanadium Micro-Alloyed Reinforcing Steel Bar
L.J. Li, X.D. Huo and L. Guo ..................................................................... 942

Effect of Hardness of Needle-Sealing Surface of Pintle Nozzle on Cavitation Erosion
H.Z. Wo, Y.F. Zhang, X.G. Hu and Y.F. Xu ................................................ 946

Study of Reactive Plasma Sprayed TiN Electrocataytic Carrier Coatings
L.H. Gao, J.X. Zhang, Y.C. Dong, Y. Yang and D.R. Yan ............................ 950

Dynamic Analysis of the Diamond Saw Blade Cutting Granite Based on LS-DYNA
M. Zhao, X.Y. Lang, F.L. Qi and D.L. Lei .................................................... 955

Isothermal Extrusion Study and Simulation of Magnesium Alloy for Hilt of Electric Screwdriver
C.T. Li, C. Wang and Y.M. Hu ................................................................... 959

Research on Water-Lubricated Bearing Applied in Propulsion Improvement of Certain Type of Motorboat
F.L. Li and T. Han ....................................................................................... 965

Study on Gyroscopic Effect of Magnetic Flywheel Rotor
X.L. Wen and C. Cao .................................................................................. 970

Study on Numerical Simulation Technology Based on ANSYS of Fracture Behavior in Metal Forming Process
Y.G. Shi, B.J. Yao, Q.L. Zhang and X.H. Mei ............................................ 976

Preparation of Silicon Nan Spheres by Using Electrical Discharge Machining Method
W. Zhang, W. Wang, J. Hong, Z.W. Zhang and Z.X. Liu ............................ 980

The Forecast for the Abrasive Wear of Metal Materials Against Plant Abrasive Based on the Grey Markov Model
X.P. Huang, J.L. Huang, J.F. Wu and K.P. Zhang ....................................... 984
Preparation of Magnetic Chitosan/Iron (II, III) Oxide Microspheres and Application in Adsorption of Cr (VI)
B. Hu and J.L. Li .......................................................... 989

Preparation and Characterization of Nanocomposite Ni-Al2O3 Thin Films by Ultrasonic-Electrodeposition Technology
J.D. Wang and F.F. Xia ..................................................... 994

Prediction of Nano TiN Particles Content in the Ni-TiN Composite Coating Based on AR Model
F.F. Xia, C.Y. Ma and J.D. Wang ...................................... 998

Prediction Model of the Charpy Impact Toughness of Deposited Metals of Welding Materials
L.G. Tong, L. Bai, H.S. Ding, L. Wang, S.W. Bai, Y.L. Sui and J.F. Yu .................................................. 1001

Research on Non-Linear Decoupling for Multi-Dimensional Force Sensor
Y.S. Zeng ............................................................... 1005

Study of Transmittance of CdS Thin Films Prepared by Spray Pyrolysis
G.M. Wu, Z.Q. Zhang, Y.Y. Zhu, Y. Cao, Y. Zhou and G.J. Xing ............................................. 1011

Advances in Research on Left-Handed Met Materials
Y.B. Ding and G.P. Zhang ................................................ 1016

Eutectic Growth Mode of Al-Si Alloy Solidified under High Pressure
L.X. Li, M. Li, H.X. Wang and Z.J. Yang ..................................... 1020

Additives Applied for Preparation of Superfine Mg(OH)2 Particles by Light-Burned MgO at Low Temperature
Q.G. Kong, H.Y. Qian, H.N. Xiao, L. Kai, J.K. Wang, J. Zhu and J. Li .............................................. 1026

Wrinkle Formation and Imprinting of Gold Film Deposited on Polydimethylsiloxane
Z.C. Chang, C.B. Lin, J.S. Ho and W.H. Yang .............................................. 1031

A Density Functional Study of Ho-Doped Si8 (n=1-12, 16, and 18) Clusters
Z.L. Liu, H.K. Yuan and H. Chen ............................................ 1035

Preparation and Research of AuNi Cathode Catalyst for Direct Methanol Fuel Cell
S.H. Yan, W.L. Zhu and S.C. Zhang ........................................... 1039

Preparation of High Compression Strength Silicon Hybrid Material at Low Temperature through Sol-Gel
P. Cui, Z.Q. Zhang and Y. Dou .................................................. 1044

Effect of Pore Size on the Hydrophilicity in Dark of TiO2 Films
Q. Wang, C.P. Lin and P. Cui .................................................. 1049

Chapter 16: Mechanical Design

Fire Fighting of Wind Extinguisher with CO2 Gas Assisted
C.S. Liu ............................................................... 1054

Characterization of Novel Perovskite-Type La8Sr2Ca2C01.7Fe2O3.5 Cathode Materials Prepared by Solid State Reaction for IT-SOFCs
C. Li, J. Zhao, L.L. Kong and Y.C. Ma ........................................... 1058

Fatigue Property of Welded Joints of Ti6Al4V Titanium Alloy in Corrosion Environment
J.C. Bao, J. Zhao and J.P. Li .................................................. 1062

Oxidation Chlorination of Thiophene in Coking Benzene
M.Y. Ling and H.H. Chen ..................................................... 1066

Research on Hysteretic Phenomenon of Metal Rubber
H.R. Hao, H.B. Bai and D.W. Li ................................................. 1070

Comprehensive Sewage-Treating Technology Using Bio-Tank of Glass Fiber Reinforced Plastics on Intensive Scaled Swine Farm
Q.X. Xu, X.F. Guan and B. Lin ................................................ 1075
Two-Dimensional Irregular Packing Algorithm for Strips Cutting Technology in Sheet Steel Industry  
M.X. Pan  
1080

Two Novel Adams Model Encapsulation Methods in HLA Based Collaborative Product Development  
C. Ma, T.Y. Xiao, W.H. Fan, H.B. Sun and Y.C. Yue  
1085

Diagnosis and Prediction for Equipment Efficiency Based on OEE in FCC M6 Welding Workshop  
Y.H. Ma, Y.B. Zheng, Y. Zhang, Y. Jiang and L.L. Zhao  
1092

The Study of the Disabled Traffic Products Based on Product Safety  
Z.H. Ye and X. Li  
1097

Dynamic Elasto-Plastic Analysis on the Steel Spatial Arch Truss with 30m Span and 0.2 Rise-Span Ratio  
H.W. Li, Y. Shi and J. Liu  
1101

Dynamics Simulation of Beam-Carried Cranes Based on Virtual Prototyping  
K.A. Liu and Q.J. Li  
1105

The Study of Signal Characteristics of Critical Sensors on a Coal-Bed Gas Engine  
J. Luo, Q. Teng and P. An  
1109

3D Rebuilding for Impeller of Centrifugal Pump Based on ICT  
X.P. Jiang, W.D. Shi, W. Li, H.L. Liu and M.G. Tan  
1114

Critical Rotation Speed Calculation and Application Development of Multi-Stage Centrifugal Pumps for Mining  
W. Li, W.D. Shi, X.P. Jiang and Y. Xu  
1119

Chapter 17: Mechanical Power Engineering

Research of Project Investment Control Based on Life Cycle Theory  
J.L. Peng and X. Li  
1123

Effects of Fillet on Kinematic Characteristic of Internal Gear Couple  
W. Song and H. Zhou  
1128

The Research about the Inverse Kinematic of the Tricept Mechanism Based on Pro/Engineer  
X.H. Huang, J.C. Xu, W. Dai and C.S. Wang  
1132

A Study of Bag-Breaking Device Based on Whitworth Mechanism  
Q. Ying and X.Y. Cheng  
1137

Research on the Characteristics of PMSM Vector Control System Based on Speed Sliding Mode Controller  
H. Fan and Y.C. Wang  
1142

Modelling and Simulation of Particle Breakage in Jaw Crushers  
L.M. Zhao, L.J. Chen, D.B. Zhang and Y. Li  
1148

Modal and Transient Response Analysis for Complex Gear-Bearing System  
J.L. Ge, G.L. Yang and J.W. Hao  
1152

Comprehensive Analysis of Wheel Drive Motor Torque Characteristics  
Q. Sun, S.G. Zuo, C.G. Ma, F.H. Zhang and S. Meng  
1156

The Inner Hole Precision Detection of Precision Machining Zirconia Ceramics Spindle  
1161

Research on Periodic Motion Stability of Gear Dynamics with Friction  
J. Wang, J.H. Zheng and F.S. Xu  
1166
Chapter 18: Mechatronics

A Novel Method of PAPR Reducing for OFDM Systems
S.L. Sun .......................................................... 1172

Mechanism of Improving Mechanical and Electrical Properties of Fe40NiCrSiAl Alloy Induced by Laser Shock Wave
R.F. Chen, Y.Q. Hua, H.X. Liu and Y.X. Ye .................................................. 1177

Study on Dual-Loop Controller of Helicopter Based on the Robust H-Infinite Loop Shaping Method
Z.Y. Lang and A.G. Wu .................................................. 1182

Simulation Modeling of Dynamic and Flexible Scheduling about Large-Sized Components Producing Workshop Based on Cellular Automata
Y. Chen, X.J. Qiu, S.Y. Zhang and J.S. Lu .................................................. 1186

Chapter 19: MEMS and Nano Technology

Study on the Effect of ZnO Buffer Layer Thickness on the Properties of MgZnO Film
X. Dong, H. Wang, J. Wang, Z.F. Shi and S.K. Zhang ........................................ 1192

A New Real-Time Position and Orientation Tracking System for Endoscopy
L.K. Liu, Z.Z. Ouyang, S. Wang, Y. Wang, X.D. Chen and D.Y. Yu ........................................ 1196

Realization of Two-Axis Macro-Micro Dual-Driven System
F. Fei, X.L. Bai and B.F. Ju .................................................. 1200

Research on High-Precision Automatic Inner Diameter Measuring System for Coaxial Transmission Line Outer Conductor
L.J. Zhan, B.G. Wang and H.Y. Ye .................................................. 1205

Energy Saving Design of Personal and Consumer Electronics Products

Analysis and Calculation of the Allowed Values of Contact Pressure in the Process of Circuit Breaker Closing Work
X.Q. Ye and T. He .................................................. 1214

Isolation Performance Evaluation of Compressor Vibration Isolating Systems Based on LMS Test. Lab Signature
L. Zhang, H. Chen, Y.J. Gong, H. Wu and S. Zhang .................................................. 1220

The Selection Model of Equipment Resource Based on AHP and Grey Correlation Analysis
J.Y. Wei and P.S. Zhong .................................................. 1226

Chapter 20: Multibody Dynamics

Contact Stress Analysis of Multilayered Strands
X.Z. Zhao, W. Peng, S.Q. Zhang and M.S. Yang .................................................. 1230

Dynamic Response Analysis of Cantilever Beam under Moving Mass by Time-Discontinuous Galerkin Finite Element Method
J.W. Hao and J.L. Ge .................................................. 1234

Chapter 21: Nanomaterial Engineering

Research on Initial Allocation and Fairness of Carbon Trading
J.R. Tang, X.D. Gao and X.F. Wu .................................................. 1239
Analysis of Dispersion Characteristic of Microstrip Lines on Ferrite and Silicon Structures with Spectral-Domain Method
H. Yang, Z.Y. Chen and K.Y. Lv ........................................................................................................ 1244

Preparation of Submicron Electrode for Electrochemical Micromachining by Multi-Step Electrochemical Etching
Y. Liu and L.S. Zhu ......................................................................................................................... 1250

Study on the Preparation of Dy-Doped TiO_2 Nanotube Arrays and its Visible Light Responsive Photocatalytic Properties
Z.B. Wang, L.Y. Su, Y.J. Guan and S.L. Bai ....................................................................................... 1254

Nanometer Titanium Dioxide Powder Preparation and its Performance
S.F. Yan and X.H. Xiong ..................................................................................................................... 1258

Experimental Research on Buckling of Nano-Thin Film under Impact Load
P. Li, L. Li, J.W. Tong, S.B. Wang, M. Zhang, J. Zhang and H. Sun .................................................. 1262

Preparation of AlNPs/CMCN Composite Nanofibers by Electrospinning
L. Xie, Z.Q. Shao and S.Y. Lv ............................................................................................................ 1266

One-Step Synthesis of Fe_3S_4 Micro-Crystals and its Facile Transformation to Fe_5S_8 Micro-Crystals
B.X. Yuan, H.H. Fu and W.L. Luan .................................................................................................. 1270

Influence of MoS_2 on the Microstructures and Properties of Ni-Based Alloying Coating
B. Han, M.P. Xue, Y. Wang and M.F. Yu ......................................................................................... 1276

Electrochemical Properties of Highly Ordered TiO_2 Nanotube Arrays as an Anode Material for Lithium-Ion Batteries
L.L. Wang, X.M. Wu and S.C. Zhang .............................................................................................. 1281

Chapter 22: New and Renewable Energy

Analysis on Efficiency of Power Generation for Various Sun Tracking and Fixed Solar Cells under Different Sunshine Environment
C.C. Wang and K.J. Lin ..................................................................................................................... 1286

Wind Energy Resource Assessment for Wind Farm
H.Q. Ma and Q.F. Wang ................................................................................................................... 1295

Study on the Design Process Based on Green Design
Y. Shu and X.F. Xiong ...................................................................................................................... 1298

The Effect of the Ratio of H/W on the Performance of the Hybrid Wall Powered by Solar Energy
B. Liu, J.H. Chen and R. Bennacer .................................................................................................... 1302

Comparative Analysis of Heat Transfer Characteristics for CO_2 and Conventional Refrigerants
J.L. Yang, Y.T. Ma and M.X. Li ......................................................................................................... 1306

On the Corrosion Behavior of Refined Bio-Oil during Rubbing Process
Y.F. Xu, W.D. Li, X.G. Hu and Q.J. Wang ....................................................................................... 1310

Energy Factor Analysis in Modular Product
Q.D. Ke, H.C. Zhang, G.F. Liu and B.B. Li ....................................................................................... 1314

Study on Parametric Design of ITER Cryostat Based on CATIA
J. Ge, H. Zhao, Y. Zhang and Y. Zhang ......................................................................................... 1318

Chapter 23: Noise and Vibration

The Adaptive Filtering Algorithms for Engine’s Noise Cancellation in Speech Signals
X.Y. Zhao, H.Y. Wang, D.Y. Fu and H.S. Zhou ............................................................................... 1323
Nonlinear Spectral Subtraction Method for Elimination of Aircraft Engine's Noise from Degraded Speech Signals
X.Y. Zhao, H.Y. Wang, S.Y. Tong, D.Y. Fu and H.S. Zhou ................................................................. 1327

Quantitative Analysis of Noise Impact on Duffing Chaotic Detection System Using Lyapunov Characteristic Exponents
W.J. Hu, Z.Z. Liu and Z.H. Li ......................................................................................................................... 1331

Research on an Improved Control Strategy for Harmonics Restraint of DFIG System
Y.F. Meng, Z.R. Dong, S.J. Hu and H.H. Xu ............................................................................................... 1338

Study on the Mechanism of Ultrasonic Vibration Aided Electrical Discharge Milling in Deionized Water

The Dynamic Analysis and Optimization Technique of Non-Stationary Random Vibration
Z. Qin and W.T. Xu ........................................................................................................................................ 1348

Study on the Influence of the Quantity of Grooves on Performance of New Balance Drum

Chapter 24: Electromagnetics

The Design of Electromagnetic Flowmeter in Partially Filled Pipes
K.X. Wei and S.R. Hao ................................................................................................................................. 1357

Speed Estimation Method for Sensor Less Control of AC Motor Drives Based on Stator Field Orientation
S.Q. Chen, F. Li and Y. Long .......................................................................................................................... 1361

Electromagnetic Analysis of Frequency Selective Surfaces Using the SSED Method
W. Xue, C. Liu, N. Zhu and X.X. He ........................................................................................................... 1365

A Method of Stabilizing Semiconductor Laser Power

Design of A 3-10 GHz Low Phase Noise YIG-Tuned Oscillator
D.B. Li and W.S. Jiang ................................................................................................................................. 1374

Study of Structure and Optical Properties of Magnetron Sputtered ZnS Thin Films by Annealing
R.F. Chen, J. Yu, Y.Q. Hua, R.L. Xu and H.X. Liu ...................................................................................... 1379

Damage Efficiency Research of PCB Components under Strong Electromagnetic Pulse
F. Xie, B. Cao and C.L. Liu ............................................................................................................................ 1383

Effects of Aperture Amount and Offset on Couplings of Strong Electromagnetic Pulse
X.P. Zhu, B. Cao and C.L. Liu ....................................................................................................................... 1387

Error Compensation of 3-Axis Magnetoresistive Magnetometer
L.B. Ding, H. Zhang and J.J. Liu ................................................................................................................... 1391

Electromagnetic Properties of Ca-Substituted Magnetic-Dielectric Composites
H. Zhong, H.L. Wang, J. Yang and Y. Shi ...................................................................................................... 1396

Optimum Design of a Magnetic Circuit in a Magneto-Rheological Damper
G.J. Yu, C.B. Du and Z.Q. Li ........................................................................................................................ 1400

Feedback Linearization for Sliding Mode Control of CNC Electromagnetic Levitation System
Y.Z. Zhang, R.Y. Wan, Z.J. Chen and Y.T. Wang ....................................................................................... 1404

Anti-Scaling Effect Comparison of High-Frequency Electromagnetic Pulses Stimulation in Different Processing Chambers
L. Xiong, Y.M. Wu, Z.H. Xi, L.L. Shi and X.F. Miao ................................................................................. 1408

Study on Electric Field Characteristics of Converter Transformer on Valve Side Winding
Y.H. Gao, G.W. Liu, Y.B. Li and Y.F. Gao .................................................................................................... 1413
<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study on SASS with Magneto-Rheological Fluid Damper Based on Improved Variable Universe Fuzzy Control</td>
<td>1418</td>
</tr>
<tr>
<td>The Electromagnetic Compatibility Design of Restrained Image Transmission Equipments</td>
<td>1422</td>
</tr>
<tr>
<td>Study of a New Electromagnetic Weft Insertion Mechanism Based on the PLC</td>
<td>1426</td>
</tr>
<tr>
<td>Electronic Structure and Magnetic Properties of Ga-Doped Heusler Alloy Co₂FeSi</td>
<td>1430</td>
</tr>
<tr>
<td>Ferromagnetism and Electronic Structure in Nitrogen-Doped ZnO Nanowire: First-Principle Calculation</td>
<td>1435</td>
</tr>
<tr>
<td>The Electronic and Magnetic Properties of Chemically Decorated Boron Nitride Sheet</td>
<td>1439</td>
</tr>
<tr>
<td>Chapter 25: Composite and Smart Materials</td>
<td></td>
</tr>
<tr>
<td>Adsorption Properties of Phospho-Polypeptide on Synthetic Hydroxyapatite Biomaterials</td>
<td>1445</td>
</tr>
<tr>
<td>Synthesis and Humidity Controlling Behaviors of Sepiolite/Poly(Sodium Acrylate-Acrylamide) Composite</td>
<td>1448</td>
</tr>
<tr>
<td>Preparation of Tetragonal and Hexagonal Calcium Zincte</td>
<td>1454</td>
</tr>
<tr>
<td>The Evolution of Free Electron Density during the Interaction between Femtosecond Pulse and Lithium Niobate Crystal</td>
<td>1458</td>
</tr>
<tr>
<td>Design and Properties of Multifunctional Lubricant</td>
<td>1462</td>
</tr>
<tr>
<td>Study on the Friction and Wear Behaviors of Cu/PTFE Self-Lubricating Composites</td>
<td>1466</td>
</tr>
<tr>
<td>The Pulverization and its Dynamic Model of Waste Thermosetting Phenol-Formaldehyde Resins</td>
<td>1470</td>
</tr>
<tr>
<td>Design and Analysis of Ultra-Low Speed Movement Equipment System</td>
<td>1475</td>
</tr>
<tr>
<td>Study of Cutting Composite Materials with Low Pressure Abrasive-Water Jet</td>
<td>1480</td>
</tr>
<tr>
<td>Liquid Flow Characteristics in Microchannels</td>
<td>1484</td>
</tr>
<tr>
<td>Research on the Properties of NiZnO Thin Films</td>
<td>1491</td>
</tr>
<tr>
<td>Effect of Supports on Stress Distributions in the Adhesive Joints</td>
<td>1495</td>
</tr>
<tr>
<td>Dew Points of C₄F₈/N₂ Gas Mixtures</td>
<td>1499</td>
</tr>
<tr>
<td>RDX-Based Energetic Material Cook-Off Characters in Different Clearances</td>
<td>1503</td>
</tr>
<tr>
<td>PVA/PVAm Hydrogel Membranes for Removal of Metal Ions from Aqueous Solution</td>
<td>1507</td>
</tr>
</tbody>
</table>
Effect of Modified-Silicon Rubber on Thermal Degradation and Anti-Droplet Properties of Polyamide 6/Melamine Cyanurate Flame Retardant Composites
N. Feng, J.H. Liu, H. Uyama and W. Liu ................................................................. 1511

Sintering, Microstructure and Dielectric Properties of Ca-Al-B-Si-O Glass/Al2O3 Composites with Various SiO2 Content

New Liquid Crystalline Material with an Azo Group in the Molecular Core
S. Chen, S.P. Li and X. Wang ......................................................................................... 1520

The Toughening Mechanism of Polyamide 6/EPDM-M/Nano-CaCO3 Ternary Composites with Sandbag Microstructure
Y.J. Wang, Y.X. Dong, Y.Q. Shi, S. Chen and X. Wang ........................................... 1523

Gelator In Situ Modify PMMA
S. Chen, J.M. Xu, G.D. Tang and X. Wang ................................................................. 1528

The Structures and High Temperature Properties of FeMnCrNiAl/Cr3C2 Composite Coatings by High Velocity Arc Spraying
Y.J. Chao, J.J. Weng, S.G. Liu, J. Li and J.P. Sang .................................................... 1532

Preparation of TiO2/CNTs Nanocomposite and its Photocatalytic Activity for Methyl Orange in Aqueous Solutions

Chapter 26: Dynamics and Vibration

On the Dynamical Behavior of Three Species System with Time Delays
D.N. Sun and Z.K. Wu ................................................................................................. 1544

Research to Blasting Vibration Distribution of an Open Pit Mine Based on Wavelet Packet Theory
Y. Yang, W. Sun and S.F. Li ......................................................................................... 1547

The High Resolution Three Lateral Logging Response Research Based on MATLA
Z.X. Han, Y.N. Li and J. Wu ......................................................................................... 1556

Study of Large Scale Measurement Method Based on Leapfrog Principle

A New Spacecraft Attitude Controller Considering Variable Saturation Limit of Flywheels Output Torque
L. Tian and S.J. Xu ..................................................................................................... 1564

Simulation and Experimental Study on the Impact of Breadth of Back Blade on Axial Force Balance

Chapter 27: Energy Engineering and Management

The Design Practice and Implementation of a Flyback Converter
T.Y. Ho, C.H. Lin and L.H. Yang ................................................................................ 1573

Discussion of Energy Consumption Analysis Method on Energy System
C.J. Zhang, L.G. Wang, L.N. Wu, T. Liu, Q. Lu and C.Q. Dong ................................ 1578

Approach to Energy Optimization Axiomatic Design Based on Design Unite
D. Zhou, G.F. Liu and P. He ......................................................................................... 1582

A Decision-Making Model of Energy-Saving Design and a Case Study
P. He, G.F. Liu and D. Zhou ....................................................................................... 1586

Y.L. Zhang, C.L. Gu and Y.J. Ding .............................................................................. 1590
Groundwater Numerical Simulation in Cool Water Well Coal Mine
Y.J. Liu, G.D. Liu, Y. He and Z.Q. Nie .......................................................... 1596

Power Quality Disturbance Research of Grid-Connected Wind Generation Based on Fractional Fourier Transform with Wavelet Entropy
H.L. Chen and Y.L. Sun ........................................................................ 1600

Economic Analysis of Solar Energy/Air Compound Source Heat Pump System
T. Liu, Z.G. Zhang and W. Zhang ......................................................... 1605

Analysis of Energy Efficiency of Solar Energy/Air Source Compound Heat Pump System under Heating Condition
B.B. Hou, Z.G. Zhang and W. Zhang ..................................................... 1609

Chapter 28: Engineering Materials

Application of Magnetic Material in Magneto Suction Cupule of Crane
J.L. Ma, W. Wang and W. Li ................................................................. 1613

Bearing Performance Analysis Based on ANSYS of Continuous Deep Beams with Opening
J.Y. Liu and H.X. Liu ........................................................................... 1617

Experimental Research on Concrete Confined by Width and Spacing of Straps of GFRP Sheets
H.X. Liu and D.M. Wang ................................................................. 1621

Modality Analysis Based on FEM of RC Deep Beams with Opening
H.X. Liu and Z. Bi ........................................................................... 1626

Numerical Analysis of Shear Lag Effect for Concrete Huge Section Box Grider
M.Q. Zhu, H.Q. Huo and S.H. Wu ..................................................... 1630

Experimental Research on Superlong Deep-Hole Drilling Processing Technology for Beryllium Bronze
Z.F. Liu and R.L. Li ................................................................. 1634

Chapter 29: Fluid Dynamics

Application Comparison about Sediment Deposition in Outer Channel by Three-Layer Mode and Analog Analysis Mode
X.X. Feng, Z. Liu and X.K. Wang .......................................................... 1638

Numerical Study of XCP Probe's Fluid Dynamic Characteristics
N. Liu, R. Zhang, W.Y. Chen and M.M. Zhang ........................................ 1645

The Heat Exchange and Stress Distributing of Expansive Soil in Site
D.J. Wei and X.G. Zhang ................................................................. 1650

Effect of Oil and HPAM in Polymer Flooding Wastewater on the Desalination Process by Electrodiagnosis
M.J. Deng, W.X. Shi and S.L. Yu ........................................................ 1654

Paper Based Microfluidic Device Using Surface Acoustic Wave as Driving Source
A.L. Zhang and Q.J. Han ................................................................. 1658

Colon-Targeted Drug Delivery Microparticles Prepared Using Electrohydrodynamic Atomization
D.G. Yu, X. Wang, P. Lu, X. Chen, H.P. Zhao, X.Y. Li, W. Qian, Y. Li and Y.Z. Liao ......................................................... 1663

Upwinding Meshfree Point Collocation Method for Unsteady Magnetohydrodynamic Flow at High Hartmann Numbers

Mesurement Instrument of Quantitative Fluorometry Intensity Based on Stoke's Shift
C.J. Zhang and Q. Wu ................................................................. 1672
Numerical Analysis of Spraying Hole Improving Permeability and its Application in Outbursting Coal Seam  
B.H. Yun, Y.P. Cheng, J.Z. Liu and X.J. Li .................................................. 1676

Compound-Fault Diagnosis of Bearing Based on Order Tracking Wavelet Packet and Rough Sets  
G. Tian, H. Tian, G.S. Liu, J.H. Zhao and L.P. Luo ........................................ 1681

3D Numerical Simulation of Fluid Flow and Heat Transfer for Asymmetric Spiral-Gear Inserts in a Tube  

The Impact of Balance Hole Radial Position of Centrifugal Pump on Axial Force and External Characteristics  

Key Technologies Related to High Vacuum Dry Pump  
J. Li, S.Y. Gan, P. Liang, J.X. Dai, D.P. Chen and T. Zhao ................................ 1696

A New Design for Liquid Mixing System  
Y.X. Tong ........................................................................................................ 1700

Numerical Simulation on Flow Structure of a Steam-Jet Pump Influenced by Primary Nozzle Geometries  
X.C. Dai and J. Huo ............................................................................................ 1703

Recycling Experimental Research of Thermosetting Phenolic Plastic Waste Based on Mechanical Effects  
Z.W. Wu, Z.F. Liu and J. Zhao ............................................................................ 1708

Experimental Study of Mechanical Properties of Fiber of Deep-Sea Mooring Cables  

Fraction of Multiphase Flow Measurement System Design and Application  
X. Bing, Q. Ping and Z. Kai .................................................................................. 1716

Chapter 30: Fuels and Combustion

An Experimental and Computational Study of Interaction between Water Mist and Gas Jet Flame  
X.J. Huang, X.S. Wang, J. Lu, Z.J. Ding and G.X. Liao .................................... 1720

Application of the Tabu Search Algorithm on Solving the Optimum Heating Institution of Reheating Furnace  
Y.J. Yang, Z.Y. Jiang, X.X. Zhang and P. Jin ...................................................... 1725

Numerical Study on the Interaction of Water Mist with a Fire Plume  
X.D. Zhao, H.L. Xu and X.S. Wang ................................................................. 1730

Research on Influencing Factors of Methane/Air Combustion in the Ring Porous Medium Burner  
J.R. Xu, J.M. Zhao, S.S. Xu and G.Q. Wang ...................................................... 1734