

Table of Contents

Preface, Committees and Sponsors

Chapter 1: Chemical Materials and Technologies

Adsorption of Congo Red from Aqueous Solutions by the Activated Carbons Prepared from Grapefruit Peel H.Y. Huang, L.D. Luo, H. Zhang, Y.Q. Lu and D. Zhang	3
Research on Coking Behavior over Catalysts for Toluene Disproportionation C.B. Fu, T. Liu, X.B. Li, J. Zhu and J.J. Liang	8
Synthesis and Characterization of Fluorinated Alkyl Substituted Disiloxane Q.C. Xi, K. Cao, Y.W. Huang, G.J. Chang and J.X. Yang	13
Application of TiO₂ Catalyst for Low-Temperature SCR of NO_x in New Style PC Kiln C.P. Li	16
Experimental Study of Adsorption of Ammonia Nitrogen from Wastewater onto the Bagasse Adsorbent L.W. Xie, Z.L. Xu, Y.H. Huang, S. Cao, Z.Q. Zhu and Y.N. Zhu	22
Alkali-Silica Reaction in Concrete Engineering Suppression Measures of Inquiry W.B. Qi, C.Y. Tian and X.X. Feng	26
Energy Extraction from Carbon Ash Burning with Fluidized Bed Gasifier K.W. Chen	32
Self-Healing Effect Caused by Accelerated Carbonation of Thermally Damaged Cement Mortar: Changes in Microstructural and Macroscopic Properties S.T. Pham and W. Prince	36
Natural Carbonation of Thermally Damaged Cement Mortar Studied by Thermogravimetric Analysis S.T. Pham and W. Prince	41
The Modulation Study of Emulsified Heavy Oil from Liquid Waste after Pyrolysis of Waste Rubber K.W. Chen	45
Influence of the Type of Cement on the Formation of Calcium Carbonate Polymorphs due to Carbonation of Cement Materials S.T. Pham and W. Prince	49

Chapter 2: Alloys, Steel Materials and Technologies

Study on Pr₆O₁₁-Doped Superfine-Grained WC-Co Cemented Carbides J. Wang and Q.K. Yang	57
Studies on the Residual Stress Distribution for 2A02 Aluminum Forgings J. Cao, C.F. Li, Y. Wang and S. Fang	62
Study on the Recrystallization Behavior of an as-Extruded PM Superalloy S.Y. Wang, Y.P. Dong, M.C. Zhang, C.Y. Wang and S. Fang	71
An Introduction of Aluminum Alloy Casting in Aircraft Structure Y. Liu, R. Zhang and J. Zhang	79

Chapter 3: Composite Materials and Technologies

Rejection of Heavy Metal Ions with Polyelectrolyte Composite Nanofiltration Membrane H.M. Chen, H.X. Guo, Y. Ma, Z.P. Qin and G.L. Xie	87
Finite Element Analysis of Materials and Processing of Composite Flywheel Rotor S.Y. Guo, C. Li and W.Y. Li	92
Thermal Characterization of a Reinforced Elastomer F. Ghezzi, X.G. Miao and R.P. Liu	97

Impact Simulation of a Crashworthy Composite Fuselage Section with Energy-Absorbing Floor	
H.B. Luo, Y. Yan, X.J. Meng, T.T. Zhang and Z.D. Liang	102
Using a Sol-Gel Method to Prepare the TiO₂/CNTs Nanocomposite	
S.H. Meng, Y. Jun, H.G. Li and S.G. Du	108
Study on the Secondary Interface in Microstructure of the Superfine Sand Concrete	
Y.N. Mi, X. Shao, J.T. Zhao, Z.G. Wang and C. Yue	112
CO₂ Permeability Characterization of High Performance Composite Coating	
A.Q. Fu, Y. Zhou, M.J. Zhu, Y.R. Feng, X.J. Li, F.S. Shangguan, C.X. Yin and Z.Q. Bai	117

Chapter 4: Advanced Research in Manufacturing, Mechanical Engineering and Industry

Parameter Design and Analysis on Axial Hybrid Magnetic Bearing Using in Magnetic Suspension Flywheel	
R.Z. Zeng and H.Q. Zhu	125
Research and Development of Data Acquisition System for NC Machining	
X.H. Cui and Q. Lui	130
An Improved Design Method of the MEMS-Based Folded-Beam Micromirror	
Y.M. Li, Q.H. Chen, Y.J. Chen and W.G. Wu	135
Servo Drive Trajectory Design of Three-Axis Laser Processing System	
W.H. Jiang, Y.C. Fan and D. Zeng	139
The Test Research of LNG Cylinder Valve	
W.P. Xu, Q. Li, Y.T. Liu and C. Wang	144
A Research on Information Collection Method for High-Precision Temperature Based on PLC Control	
J.S. Li	148
Research of Modal Analysis Based on Different Modeling Methods and Different Element Types	
J.P. Yu, L.M. Zhang, W.H. Zhang, X.F. Huang and G.H. Huang	153
Profile Loss Correlations Accounting for Turbine Disk Inclination	
Z.W. Yuan, J. Zhang and D.S. Zhu	159
Numerical Study of the inside Flow Field and the Rectangle Channel Impeller of Roto-Jet Pump	
W. Zang, X.C. Li, Y. Chen and Y.T. Luo	164
Fabrication of the Open-Loop MEMS-Based Tilting Mirror Using the Compound Process	
Y.J. Chen, Y.M. Li, Q.H. Chen and W.G. Wu	169
Numerical Simulation of Vertical Axis Wind Turbine Blade Airfoil Performance	
L.H. Zhao, M. Liu, T. Lv and X.Q. Mei	173
Research on Simulation Analysis of Plug-In Hybrid Light Bus Powertrain	
T.T. Yin, W. Cheng, K. Xu, K. Gu and X.J. Zhang	178
The Application of GIS Spatial Analysis Method in Biomass and Carbon Storage Jatropha Curcas	
X.H. Xu and X.Q. Zhao	184
Simulation of Roll-Over Protective Structure and Falling Object Protective Structure Tests on Heavy-Duty Mining Dump Truck	
X. Zhao, W.M. Zhang and J. Yang	188
Design of the MEMS-Based Straight-Beam Micromirror Using a Genetic Algorithm	
Q.H. Chen, Y.M. Li, Y.J. Chen and W.G. Wu	193
Physical Interaction Design with the Tactile Materials - The Case Study of Visually Impaired Camera	
Y.Y. Guo, M. Liu and M.Y. Zhou	197
Coherent and Co-Current Flow Separator Optimized Experiment	
B.J. Liu, J.Y. Dong, C.T. Liu, L.P. Guo, Y.P. Li and W.Y. Shan	202
The Analysis and Improvement Measures on Green Impact of CNC Machine Tool Spindle System	
X.R. Zhu and G.P. Wang	207

Research and Application of Special-Shaped Thin-Walled Parts Processing Technology D.Y. Sun	213
Motion Analysis for Vegetable Potted Seedling Pick-Up Mechanism with Double Crank Geared Linkages C.H. Yang, X.F. Fang, X. Jin, Z.J. Liu, J. Liu and Y.H. Guo	218

Chapter 5: Dynamics and Mechanics in Manufacturing and Materials

Frication and Abrasion Resistance of a Non-Woven Filter Material J. Dong, M.Y. Chen, R.J. Sun and K. Lai	227
The Effects of Nucleation on Soot Dynamic Evolution Based on the Method of Moments J.P. Liu, M.R. Wei, H.L. Xiao and F. Peng	232
Fracture Behaviors of the Rolled Isotactic Polypropylene J. Jia, S.X. Liu and D. Rabbe	237
Experimental Research on the Stiffness of Gravel Cushion with the Influence of Geogrid L.S. Huang and J. He	242
The Current Status and Future Directions of Cutting Tool Materials Y.P. Dai and S.Q. Xu	247
Effect of Hydrothermal Aging on the Phase Stability, Microstructure and Mechanical Properties of Dental 3Y-TZP Ceramics Z.K. Wu, N. Li, J.Z. Yan and W.Q. Zhao	251
Anti-Rutting Performance Analysis of Asphalt Mixture with Different Natural Asphalt W.T. Huang and G.Y. Xu	256
Rock Pressure Activity Regularly due to Underground Mining of the Deep Phosphorus Ore with Several Inclination by Similar Material Simulating Experiment X.S. Li, Y.J. Li, M.L. Wang and S. Hu	260

Chapter 6: Dynamics and Mechanics of Physical Processes in Engineering

Off-Design Load Characteristics of Consumption-Deviation Coefficient for 300MW Circulating Fluidized Bed Coal-Fired Unit G.H. Wu, Y.S. Lin, Z.S. Yu and X.Q. Ma	267
Numerical Simulation of the Flow Characteristics of 35t/h Internally Circulating Fluidized Bed Y.L. Chen, Q. Wang, C.C. Liu and J.X. Ge	272
A Comparison of 3D and Axi-Symmetric Models in Pipe Welding Simulation Process J. Xu, X.L. Jia, Y. Fan, Z. Sun, A.M. Liu and C.H. Zhang	277
Thermal Deformation Analysis on Joint-Locking Device Used in Space Deployable Equipment B.F. Yuan, S. Gao and X. Li	282
The Fine-Structure Interpretation and Favorable Objective Evaluation of Quanyidian in Fulongquan Area M. Hou, Z. Qin and Z.H. Wang	286
Fea Analysis for the Trunk Beam of the Portal Crane K.L. Li, L.L. Wang, N. Shan and W.X. Tang	291
Numerical Simulation of the Aerodynamic Performance of a H-Type Wind Turbine during Self-Starting W. Zuo and S. Kang	296
Hydrostatics Analysis on the Uprighting Process of a Capsized Ship D.W. Pan, C.X. Lin, D.P. Sun, C.Y. Zhou and P. Xu	303
Mechanical Properties Research Based on Snowplow Operation Device Y.F. Liu, Z.Z. Dong, W.Z. Chen and G.Z. Li	308
Modeling the Rate Dependent Hysteretic Dynamics of Magnetostrictive Transducers X.Q. Du, L.X. Wang, Z.F. Tang and F.Z. Lv	312
Experiments and Evaluation of Body Pressure Distribution on Wheelchair Cushion Y. Liu, X.F. Zhang and Y. Ma	317

Lubricating Characteristic Analysis on Automobile Continuously Variable Transmission M.S. Li and Q.G. Du	321
 Chapter 7: Modeling, Simulation, Testing, Measuring, Monitoring and Detection	
Online Measurement Experiment and Data Analysis of the Slideway Straightness Motion Error for CMM F.F. Wang and W.M. He	329
Structural Design and Simulation of a Fully Decoupled Dual-Mass Micro-Gyroscope B. Dai, B. Yang, H. Zhao, Y.P. Deng and X.J. Wang	334
Research on Parametric Modeling Method of Product Based on Directed Graph Y. Li, Y.Y. Xie and Y.T. Zhang	339
Mechanical Seal Condition Monitoring Technology Research Z. Zhang, K. Chen, E.Q. Zhang and P. Fu	344
Technique for Magnetic Bearing Based on Mixed-Kernel Support Vector Machine Forecasting Model J. Jin and H.Q. Zhu	349
Recent Progress of Shannon Sampling Theory with Applications J.F. Long, Y.J. Han and P.X. Ye	354
Concurrent Core Test Based on Partial Test Set Reusing X.L. Huang, M.X. Yi, L. Wang and H.G. Liang	359
The Motion Simulation of the Crawling Phenomenon of CNC Machine Tool M. Yin, W.T. Cheng, L.J. Bai and L.L. Guo	364
Nighttime Motion Vehicle Detection Based on Multiple Instance Learning S.P. Zhu	370
The Simulation Analysis of Temperature Effects on System Performance of Silicon Micro-Gyroscope Y.P. Deng, B. Yang, X.J. Wang and B. Dai	375
Target Tracking Using Extended Kalman Filter with Bearing and Doppler Measurements H.W. Quan	379
Characteristic Comparison of Waste Rubber Derived Fuel and Fossil Fuel and Application Test in Engine M.W. Shao and Y.J. Huang	383
A Study on Feasibility Test of Application of Waste Rubber-Derived Renewable Fuel Improved Biodiesel in Diesel Engine M.W. Shao and Y.J. Huang	387
Monte Carlo Simulated the Detection Efficiency of Different H/R Ratio of NaI:Ti Crystal J.P. Hu, F. Liu and X.P. Ouyang	391
Research of the Laser System for Real-Time Measuring the Muzzle Velocity of Projectile Z.H. Xiao, W.S. Xie and J. Tang	395
Research on Aero-Engine Gas Path Detection System Based on Electrostatic Induction J.Y. Liu and P.F. Liu	400
The Research and Development of High Precision Gas Flowmeter Detection System Y.L. Zhao, J.M. Zhang and M. Jiang	405
Optimal Design of Computerized Flat Knitting Machine Cam Curves Based on UG and ANSYS/LS-DYNA C. Zhao, G.L. Song and L. Xu	410
Flatness Assessment System of Ultra-Wide Tandem Cold Rolling Mill R.R. Bao, J. Zhang, H.B. Li, J. Wang, Y.G. Chu and M.G. Li	415
The Application of Elevating Integrated Monitoring Device in the Coal Silo Z.J. Song, L. Wang, B.H. Li, S.F. Si and D.J. Dai	420
Mutual Mode Entropy Based Coupling Analysis of Electroencephalogram J. Yu, J.F. Dai and J. Wang	425
The Design and Analysis of the Key-Stream Generator Based on the AES H. Shi, X.D. Qian, J.W. Lu, J. Gong and Y.Q. Deng	430

Study on Current Sensor Based on Holzer Reaction Principle in Detection of Automobile Power System	
B. Zhang and L.L. Wang	434
Identification of Creep Parameters of P91 by Small Punch Test	
J.F. Geng, H.S. Cai, D.F. Ma, X.S. Feng and K.S. Guan	439
De-Noising Method for Partial Discharge Signal Based on Wavelet Transform and Partial Differential Equation	
J. Zhang, F.J. Mo, F. Yao and X.J. Wang	444
Analysis on Pedestrian Speed at Signalized Intersections with Exclusive Pedestrian Phases	
M. Song, S.H. Qin and H. Chen	448

Chapter 8: Power Electronics and Drive Systems

Distribution System Fault Recovery with Undispatchable Distributed Generations	
N. Xu, S.S. Li and H.M. Liu	455
Force Analysis of Engine Crankshaft Based on Finite Element Method	
Y.X. Chen	460
Hardware-In-Loop Test Platform for Electronic Control Unit of Fuel Cell System	
L. Li, J. Yao, F. Liu and Z.F. Weng	465
Research in Power Module Test Platform of HXD2 Electric Locomotive	
W.H. Wu, X.J. You and X.Z. Guo	471
Application of Reference Designation for Power Plants to Wind Turbines	
L. Yi, S.Y. Liu and Q.Q. Yu	476
Experiments of Low-Grade Heat Organic Rankine Cycle Power Generation Optimal Load Characteristics	
L. Tang, Y.P. Wang, P. Yang and Y.W. Weng	481
Double Position Loop Design of AC Servo Drive System	
W.H. Jiang, Y.C. Fan and Z. Liu	486
The Mobile Battery Recharging/Swapping System for Electric Vehicles - A Valuable Instantiation of Internet of Things	
J. Zhou, G.Q. Yang, G.C. Tang and M. Zhu	491
Research on Control Strategy of Microgrid Inverter Based on Virtual Synchronous Generator	
X.C. Xu, L. Zhu and B.F. Guo	496
Regulator Circuit Transformer Voltage-Second Product Analysis	
C. Zhang and M.Z. He	501
Impedance Analyzer Design Based on EMI and Lamb Wave	
Y.X. Zhang, X. Zhang, S.Y. Chen and J.Z. Chen	506
The Design Based on Integrated Criterion to Faulty Line Selection for Small Current Neutral Grounding System	
H.M. Hu, Q.F. Li, B. Hong and N. Fang	511

Chapter 9: Control Systems and Application

Research on Control Method of Hybrid Energy Storage System in Field of Distributed Generation	
Z.C. Wang	519
Decoupling Control for Bearingless Synchronous Reluctance Motor Based on Fuzzy Inverse Model	
Z. Li, H.Q. Zhu and R.Z. Zeng	524
Study on Direct Suspension Force Control of Bearingless Permanent Magnetic Slice Motor	
Y.Y. Gu, H.Q. Zhu and R.Z. Zeng	529
Decoupling Control of Three Degrees of Freedom Hybrid Magnetic Bearing Based on LS-SVM	
Y.Y. Li and H.Q. Zhu	534

Mathematical Model and Control of Axial Hybrid Magnetic Bearings Based on α-th Order Inverse System Theory R.Z. Zeng and H.Q. Zhu	539
The Application of Servo Motor Direct Drive Pump Control System in Pre-Bending Machine H. Wang and Y.M. Xu	544
Research on Reconfigurable Method of Open CNC System Software Based on Linux S.Z. Li and S.W. Lin	549
The Power Distribution Control Study in Parallel Hybrid Electric Vehicle Based on Fuzzy Theory R.F. Li and D.Y. Song	554
Signal Analysis of Magnetic Control Seam Tracking Based on the Hilbert-Huang Transform B. Hong, A.J. Xu, J. Liu and X.W. Li	559
Study on Control Technology of Pneumatic Servo Spot Welding Gun Z.S. Sun and J. Dai	564
Research on Steam Discharge System Based on Pressure Control Mode Y.S. Zhang and Y. Tang	569
Development of Supervisory Control System for Hydraulic Hybrid Vehicles B. Zhao, H. Sun, W. Liu, Y. Zhao and J.W. Han	574
The Application Research Based on Solar Gas Boiler that Control by PLC and Frequency Conversion Technology J.X. Jiang, B. Zhang and S.L. Yi	580
Analysis and Control of Internal Flow Induced Noise of Rotor Oil Pump H. Cai, J. Li, L.P. Yu, Y.F. Liu and Y.H. Geng	585

Chapter 10: Automation, Optimization, Algorithms in Manufacturing and Industry Application

Calculation Strategy of Automatic Shape Control in Hot Strip Mill Z.Y. Liu, Y.G. Sun and X.R. Song	591
Optimization on Hardware Inventory of the Steel Pipe Enterprise Based on Cluster-Algorithm Z.Q. Yang, S.H. Dong and C.W. Li	595
Research on the Gerschgorin Radii Estimator Based on Real-Valued Decomposition Technique in Picosatellites J. Tang, M.J. Fan and J. Hu	600
Study on Optimization of Numerical Simulation for Smooth Blasting Parameters in Xishimen Iron Mine J.D. Qi, P. Wang, Y.T. Gao and Z.A. Jiang	605
Optimization of Malachite Green by KOH-Modified Grapefruit Peel Activated Carbon: Application of Response Surface Methodology L.D. Luo, H.Y. Huang, J.H. Bi, L.L. Tan, H. Zhang and D. Zhang	611
Comparison of Prognostic Algorithms Based on PF and EKF for Estimating Remaining Useful Life of Li-Ion Batteries J. Zhang, A.T. Gao, W.B. Wang, Y.S. Han, R.G. Chen and F. Zhang	616
Forecasting Performance Comparison by Using Power Transformation between VAR and Bayesian VAR Models S.K. Kung and C.H. Wang	621
Efficiency Analysis of Series Connection Ground Source Heat Pump Water Chiller-Heater Unit C.Y. Tan, P.F. Yang, M.M. Wang, H.H. Hu and G.Q. Zhang	625
Wear Analysis of Warm Extrusion Dies Using DEFORM Y.Q. Li and A.M. Zhang	630
Car Suspension Simulation and Optimization S.Y. Zhi and Y. Luo	636
Research on the Optimization of the Lower Arm of WEDM Taper Machine J.X. Qi, Z.X. Mao, C.T. Cai and D.D. Luo	641

A Novel Approach for Path Planning Based on Reactive Behavior-Artificial Potential Filed L.X. Yang, Z.X. Liu and H. Tang	646
A Novel Line Segments Extraction Algorithm with Variant Constraints Y.G. He, X.Z. Bu, M.J. Fan and J. Hu	650
Numerical Analysis of Temperature Distribution in Generator Stator Bar with Different Insulation Thermal Performance L. Zhang and Y.M. Lei	655
A Novel Finite Element Method Based Beam Propagation Method without Using Slow Varying Envelope Approximation B. Yu, H. Xia, Z. Xu, X.Y. Chen, X.H. Sun and J.X. Ge	660
An New Method for Process Decision-Making of Slot Based on Features H.J. Jing, C.H. Yin, Q.J. Zhou and C.Y. Tang	665
Coupling Analysis of Electroencephalogram Based on the Multiscale Mutual Mode Entropy N. Ji, J. Tan, A.S. Pei, J.F. Dai and J. Wang	670
Research on Attention EEG Based on the Multiscale Jensen-Shannon Divergence Z.X. Zhang, S.Q. Xu, E.N. Zhou, X.L. Huang and J. Wang	675

Chapter 11: Network, Communication, Computer and Information Technologies

Task Description Logic Based on Temporal Constrain Net C. Yu and W.J. Zhou	681
Longyuan Spare Parts Management System Development L. Yi, H.T. Li and J. Peng	686
Design of Soil Pollution and Restoration Simulation System Based on LabVIEW and PLC A.F. Hao, R.Y. Wang and X.M. Ye	693
Research status and Application Analysis of 3D Printing Technology W.L. Ma, F.H. Tao, C.Z. Jia and J.C. Yang	697
Method of Gun Barrel Life Prediction Based on BP Network Y.D. Yang, J.S. Ma and C.Z. Jia	701
Design and Development of Virtual Interactive System for Paper-Cut Producing Process X.F. Wang and Y.Z. Wang	705
Construction of the Computer Network Reliability Evaluation System X.C. Zhang, M.Y. Duan and L.Q. Wang	710
Study on the Development of Smart Library under Internet of Things L. Du and T. Liu	716
A MAC-Layer Network Coding Opportunity Optimization Scheme in Multi-Hop Wireless Networks F.J. Shang and Z. Geng	721
Based on Computer Graphics Visualization Technologies R. Zhang	726
Bidirectional Random Walk Based Mobile-Sink-Location Privacy in WSN J. Zhang	730
Enterprise Car Service Management System Design Based on MVC Framework Y.F. Dai and D. Shao	735
Virtual Software Testing Service Based on Cloud Computing S.K. Liu, J.P. Tang, J.F. Chen, S. Duan, L.L. Li, Q.Y. Kuang, M.L. Cai and D.P. Hu	739
Computational Experiments Applied for Space System Simulation H.R. Tang, Z.Y. Wu, C. Xue and Z. Li	743
A 12-Input-3-Output RBF Neural Network Model of Load and Main Steam Pressure Characteristics for Ultra-Supercritical Unit Y.G. Ma and Z.Y. Ye	748

Chapter 12: Management and Education

Application on the Artificial Filling Foundation Treatment for Housing Construction Project in Mountain Highway A.L. Zhang and D.N. Qi	755
Studying and Application of Apriori Algorithm in Analysis of Students' Achievement Y.F. Dai, Y.H. Zhao and H. Gu	759
The Research on Cost Management of Steel Pipe Enterprise Based on Activity-Based Costing H.P. Geng, S.H. Dong and H. Zhang	763
Constructing a New Mode of Teaching Demonstration Center of Experimental Teaching of Mechanics of Materials Y.X. Chen	768