Table of Contents

Preface, Committees and Sponsors

Chapter 1: Materials Science and Processing

Study on Preparation and Properties of Vitrified Beads-Polystyrene Particles Insulation	
Mortar Y.P. Chen, W.H. Tao, X.H. Fu, L.Y. Dong and H.T. Yu	3
Study on Preparation and Properties of Composite Insulation Mortar Y.P. Chen, X.H. Fu, W.H. Tao, L.Y. Dong and H.T. Yu	7
Structure and Dielectric Properties of Mg, Cr-Doped LaSrFeO ₃ Films Y.L. Hou, X.H. Fu, W.H. Tao and X. Jin	11
Piezoelectric Properties Study of KNN-LS Lead-Free Ceramics Synthesized by Sol-Gel Method	1.5
X. Jin, X.H. Fu, W.H. Tao and Y.L. Hou Existing and Weap Performances of Magnesium Alley against Steel under Lubrication of	15
Friction and Wear Performances of Magnesium Alloy against Steel under Lubrication of Soybean Oil with S-Containing Additive J.H. Fang, D.Y. Xia, B.S. Chen, J. Wu and J. Wang	19
Experiment and Research of EDM Surface Modification of Titanium in Mist Medium X.J. Hu, L.R. Cai, M. Li and W.G. Huo	24
Red Mud Based Geopolymer and its Forming Mechanism Y. Fu and Z.Q. Xiong	28
Multiple LAMMPS Script of Graphene Crystal Cell Z.X. Hui	32
Coloring Mechanism of Rare Earth Polishing Powder and Study of its Factors E.W. Liang, S.Z. Yi, Z.J. Wei, L.H. Ren, Z.X. Fang, X.L. Wang, Y.Y. Wu and X. Zhang	36
Study on Chemical Mechanical Polishing Removal Mechanism of Monocrystalline Silicon H.W. Du and Y.N. Chen	40
Brush Plating Surface Strengthen of the Cr12MoV Stamping Die G.S. Li and J. Ding	44
Research on Methods of Improving Fatigue Property of Low-Strength Steel Welded Joints C.R. Li, Z.P. Cao and Z.T. Fang	48
Diffusion and Oxidation Wear of PCBN Tool when Cutting Materials Difficult-to-Cut Based on Thermodynamics	5.4
F. Shao, Y.T. Wang, L.J. Zou, Y.Y. Wu and D. Sun The Silicon Plates in Buried Oxide for Enhancement of the Breakdown Voltage in SOI	54
MESFET	
A.R. Estakhrian Haghighi and M. Mohamadi	58
Simulation Research of Deuterium and Tritium Ions Motion in Accelerating Electric Field for Neutron Tube	
J.P. Huang, G. Liu and S. Qiao	62
Adsorption of Phthalates onto Nanofiltration Membranes: Effect of Solution Chemistry A.H. Cheng, X.D. Wang, L. Wang and D. Zhao	68
The Non-Newtonian Fluid in the Collision L. Hou, J.J. Zhao and L. Qiu	72
Chapter 2: Research and Technologies for Engineering	
Parametric Design and Modal Analysis on Oval Gear Based on CATIA Z.D. Huang, Y.P. Du, H.X. Li, X.L. Sun and Y. Wang	79
Precision Analysis and Control of the Mold Rapid Development Based on Reverse Engineering	
J. Fan and L.G. Wang	83

The FEA Comparison of the Front Sub Frame in a Car between JDM2 Magnesium and Steel	
D.B. Zhao	87
Dynamics Characteristics for Contact Surface of Machine Tool W.P. Luo	91
Dry Gear Hobbing Machining Experiment and Research on Process Parameters J.L. Zhou, Z.H. Sun, Q. Tan and Y.C. Xie	95
Application of the Finite Piece Method to Simulate Viscoelastic Fluid Flows in L-Shaped Channel	
Y. Li and Z. Yang The Research about Parallel Mechanism Workspace for Quenching	100
T.J. Zhao and Y.L. Wang	104
The Effect of Loading Path on Forming Results in Multi-Gripper Flexible Stretch Forming Y. Wang, M.Z. Li and H.W. Liu	108
Design and Simulation of High-Speed Spiral Flow in Hydraulic Lifting System J. Tang, R.J. Gao and S.W. Hu	113
Application Research of Virtual Prototype Technology in the Variable Stiffness Suspension Matching of Light Bus D.G. Fang, G.X. Wei, W.K. Shi and C.X. Wang	118
The Influence Caused by each Assembly Misalignment on the HGT Hypoid Gear's Meshing	
Performance X. Wang, Z.D. Fang and S.J. Li	122
A Multi-Objective Programming Model of Dynamic Adjusting Flight Traffic Z.N. Zhang, Z.Z. Hao and Z. Gao	127
Research on the Latest Maneuver Moment of Aircraft and the Minimum Safety Distance between Aircrafts in Free Flight	
Z.N. Zhang, Z. Liu and D.M. Zhang	134
Study on the Automotive Body Collision Damage and the Repair Method H.T. He and S.Z. Chang	146
On-Orbit Servicing Task Allocation for Multi-Spacecrafts Using HDPSO Y. Zhang and Q. Zhang	150
Analysis of an On-Orbit Replaceable Mechanism Based on ADAMS M.L. Han, Y.B. Cui, J.X. Zhang and Q. Zhang	154
Research on Path Planning of Manipulator for Aerial Boom Refueling Test System D.L. Yuan, C.X. Zhao and Z.B. Xiao	159
Research on the Influence Factors for Bus Based on Nonlinear Model Y.G. Yan, H.G. Xu, H.F. Liu and B. Ma	163
Convergence Theory for Unified Discrete-Time RNNs with Quasi-Symmetric Connection H.Z. Mao, C. Qiao, W.F. Jing, X. Chen and J.Q. Mao	167
Fault Prediction Method of the Marine Gas Turbine Based on Neural Network-Markov J.G. Cui, L. Zhang, G.H. Wang, B. Cui and L.Y. Jiang	171
In-Cylinder Heat Transfer Model for Diesel Engine Based on Improved Woschni Correlation	
X.R. Liu, G.X. Li, Y.P. Hu, S.Z. Bai and K.Y. Deng	175
Research on Linear Motor in Deep Exploration Based on Experiment Z. Yan, K. Wang, S.C. You, J.P. Xiao and S.H. Cheng	179
Visual Modeling and Simulation Research of a Kind of On-Orbit Servicing Spacecraft B.S. Li, J.X. Zhang, Q. Zhang and X.P. Wei	184
Design of a Compact UWB Antenna Using Two Modified U-Shaped Slots for Satellite Frequency Rejection in C-Band and X-Band L. Li, Z.Z. Zhao and X.L. Yin	189
Satellite Module Layout Design Based on Adaptive Bee Evolutionary Genetic Algorithm J.J. Su, C. Che, Q. Zhang and X.P. Wei	193
A Supervisor Management and Evaluation System Based on Real-Time Location System H.C. Jiang, P. Lin, M.S. Qiang and Q.X. Fan	198
Research of Real-Time Fault Diagnosis Platform of Aero-Engine's Fuel Flow Sensors Z.R. Sun and Y.G. Sun	206

Research of Stitching Scraps Automatically Based on Cluster Analysis C.S. Cao	210
Design of Sweet Potato Vine Chopping and Returning Machine H.W. Du and Z.Z. Han	214
Key Technologies for Health Management and Applications of Aero-Engine Based on	
Principal Component Analysis J.G. Cui, X. Zhao, J. Li, B. Cui, L.Y. Jiang and J.Q. Shi	218
Chapter 3: Electrical Engineering and Apparatus	
Dynamic Simulation of a Two-Stroke Spark Ignition Free-Piston Engine Generator Y.T. Jiang, D.J. Wang, F.S. Liu, S.W. Zhao and Q. Yang	225
Study on Generating Characteristics of Free-Piston Engine Generator D.J. Wang, Y.T. Jiang and F.S. Liu	231
Performance Analysis of Direct-Driven Permanent Magnet Generator with Output Power of 3MW	
Y. Zhang A Novel Meduletian Method for Meduler Multilevel Converters	235
A Novel Modulation Method for Modular Multilevel Converters H. Wu and P. Wang	239
Research on Experimental Methods of Evaluating Deterioration Performance of High-Voltage Insulators J.Z. Cheng and S.Y. Wang	243
A Forecasting Method of Short-Term Electric Power Load Based on BP Neural Network H. Bin, Y.X. Zu and C. Zhang	243
Zone Selective Protection System with Multiple Power Sources W.G. Chen, F. Du, Y. Zhuo and M. Anheuser	251
Modeling and Solving on the Solar Photovoltaic Cells Paving Optimization on Buildings C.S. Cao	256
A Novel Flyback LED Driver Based on Primary Side Feedback without Auxiliary Winding Z.G. Han and P.C. Xu	260
The Study of LED Linear Dimming with Hysteresis Current Driver and Peak Current Detection Driver	265
G.B. Chen, T.C. Huang, Y.G. Leu and K.T. Hung Assessment of Wind Turbine's Power Curve Based on Performance Reliability Theory M.Y. Zhang, X.M. Rui, J. Huo and Y.F. Zhao	265 270
A Predictive Model of SOFC Thermal Management Based on LS-SVM Y.Y. Zhang, J.D. Huang and Y. Zhang	270
1.1. Zhang, v.D. Haang and 1. Zhang	271
Chapter 4: Electronics and Integrated Circuits, Embedded Technology	
Circuit Designs for an Automation Intelligent Electrical Distribution Terminal Unit Based on DSP	
L.J. Hu, H. Song, X.H. Zeng and W.P. Zhou	281
Design of an Intelligent Help System Z.P. Lan, Y.R. Wang, P. Li, Y.D. Lin, H.M. Meng and Z.S. Wang	285
Design of Arithmetic Operation Core in Embedded Processor for High Definition Audio Applications Z.Q. Wei, P.L. Liu, J. Kong and R.D. Ying	289
Design of USB2.0 Data Exchanging System Based on FPGA H.D. Qian and J.C. Li	293
Hierarchy Design of Digital System Based on EDA Technology	
H. Zhao	297

Chapter 5: Construction and Geology Research

The Development of Self-Test Box for Magneto Telluric Recorder K. Chen, W.B. Wei, M. Deng and D. Zeng	303
Feasibility Study of Heat Utilization from Waste Oil Wells H.W. Jin	307
Analysis of Dynamic Characteristics of Pile-Soil-Water Coupling Effect in Consideration of Large Span Cable-Stayed Bridge W.Y. Chen	311
Experimental Study by Using Drilling Core Materials Inversion Formation Rock Fracture Toughness Test Research L. Zhu	315
Experimental Studies of the Longitudinal Flexibility of Balloon-Expandable Coronary Stents	
X. Shen and X. Zhou	319
Effect of Material and Work Status of Vascular Stents on Flexibility Property of Stents X. Shen, X. Zhou and T. Ge	323
Chapter 6: Analysis, Testing and Monitoring	
Measurement of Cutting Speed of Mechanical Excavator Y.J. Hou, J.S. Wang, A.F. Li, S.H. Gao and G.Q. Wang	331
The Test System of Submersible Motors Performance Based on LabVIEW C.Q. Zhang	335
Research Status and Trend of On-Board Diagnostics G.T. Yao, H. Wu and Z.R. Guo	339
Design of Ultrasonic Ranging Alarm Device Based on SN8P2501B P.F. Zhang, L.K. Ma and H.Z. Li	344
The Ammonia Leak Monitoring and Warning System Based on Wireless Sensor Network in Industrial Environments G.X. Yang and W. Han	348
Application of Timesten on Web-Based Monitoring System W.R. Bai, N.B. Wang, J.C. Zhu and B.F. Zhang	352
A Comparative Study of Fatigue Criteria for Engineering Application N.N. Sun, Y.J. Chiang, G.X. Li and Y. Wang	356
A Survey of Collision Detection R.R. Man, D.S. Zhou and Q. Zhang	360
Chapter 7: Robotics and Control Systems	
The Trajectory Planning and Simulation for Industrial Robot Based on Fifth-Order B-Splines	
Z.J. Gou and C. Wang	367
Indoor Autonomous Navigation Technology Research Based on Lidar for Quad-Copter Aerial Robot Z.J. Bai, Y.F. Ji, L.N. Wu and Q. Lin	371
Optical Flow-Based Monocular Vision/INS Integrated Navigation for Mobile Robot Indoors	3/1
X.Y. Chen, J.P. Gao, Y. Xu and Q.H. Li	375
Iterative Learning Control for a Class of Modeling Undesirable Single Degree of Freedom System W. Zhou and B.B. Liu	379
On Stereoscopic Machine Vision with Limited Horizons	317
Y.M. Chen, X.L. Wang, C. Zhang and X.M. Meng	383
Nonlinear Control Approach of an Electromagnetic Bearing System S.J. Liu, Y. Fan, J. Di, Y.J. Liu, W. Qin and S. Li	387
Feedback Linearization Control of Electric Arc Furnace System Based on dSPACE Simulation	
Y. Gao and X.H. Liu	394

Solar Energy Traffic Control Box Design X.F. Bai, H.N. Cai, S. Qiu, P. Li and X.N. Song	398
Study on Key Technology of High and Low Temperature Test System for Flight Control Unit	
Q. Zhou and B.B. Hong	402
Approximate Controllability of Boundary Control Systems with Nonlinear Boundary Conditions L.W. Wang	408
Design of the Three-Dimension Motion Platform Control System Based on EtherCAT C.F. Kang, S.J. Li, X.D. Huang and C.M. Ma	413
Design of Electronic Control System for Free-Piston Engine Generator D.J. Wang, Y.T. Jiang and F.S. Liu	417
Application of Fractional-Order PI^{λ} Controller for PMSM Speed Control W. Xue and Y.L. Lu	421
Research on Multi-Speed Control of Variable-Frequency Drive X.N. Song	425
Rotor Orientation Control Strategy of a Linear Arc-Shaped Induction Motor with Multiple Stators	.25
J. Di, Y. Fan and S.J. Liu	429
Chapter 8: Informational and Communication Technology, Signal Processing and Algorithms	
Self-Tuning Weighted Fusion Kalman Filter for ARMA Signals W.Q. Liu, G.L. Tao and N. Han	439
Depth Analysis of Typical Accident with FTA Technology X.Q. Liu	443
Collaborative Optimization Algorithm Based on the Penalty Function Z.X. Jiang, P.C. Meng, Y.Z. Li and W.S. Yin	447
Effect of Dichotomous Noise on Dynamics of Spiral Waves L.J. Xu, G.Y. Yuan and Z.C. Luo	451
Image Measurement of Traffic Flow Parameters and its Traffic Congestion Evaluation D.Y. Jia and P. Hu	455
An Analysis of Factors Influencing Foreign Language Self-Efficacy Based on C5.0 Decision Tree Algorithm in Data Mining X. Li	460
A New Application of Kalman Filtering Algorithm Based on Interval Calculation in Navigation System	100
S. Wang and C. Gu	465
Optimization of Control Parameters Based on Multi-Objective Genetic Algorithms for Spacecraft Large Angle Attitude Q. Huang, J.X. Zhang, Q. Zhang and X.P. Wei	470
Motion Key-Frames Extraction Based on Locally Linear Embedding X.L. Dong, D.S. Zhou and Q. Zhang	476
Human Motion Capture Data Segmentation Based on LLE Algorithm S.L. Zhang, D.S. Zhou and Q. Zhang	481
Input-to-State Stability of Multi-Agent Systems X.L. Wang, Q. Sun and Y.M. Chen	486
A Novel Multi-Service Passive Optical Network Based on the Wavelength-Division- Multiplexed Technology	
P. Li, Z.P. Lan, Y.R. Wang, H.L. Lv and N.Y. Zou	490
Design of Intelligent Transportation Wireless Module Based on STM32F207 Y.R. Wang, P. Li, Z.P. Lan and D.M. Lei	494
Research on the Applications and Characteristics of the Wireless Sensor Network $M.Z.\ Qu$	498
A Range Free Acoustic Localization Algorithm in Wireless Sensor Networks J.S. Ai and X.H. Chen	502

The Study and Application of Improved Micro-Genetic Algorithm Based on Cauchy	
Mutation M.H. Chen	508
An Improved Task Scheduling Algorithm Based on Multi-QoS in Cloud Computing F.S. Li and Y.S. Lou	512
Study of Cluster-Footprint Analysis Testing Algorithm and System Y. Li, N. Pan, X. Wu, C. Liu and Y. Liu	516
Study of Intelligent Evidence Management System F. Liu, X. Wu, N. Pan, J. Zhou and Y. Liu	520