

# Table of Contents

## Preface and Organizing Committees

## Chapter 1: Materials Science, Processing, Technology and Engineering

<b>New Mortar for Clay Masonry Structures</b> F. Gouny, F. Fouchal, P. Maillard and S. Rossignol	3
<b>Quantitative Determination of Arsenate in Dried Shrimp by Spectrophotometric Measurement of its Heteropoly Blue</b> C. Suitcharit	9
<b>Inverse Problem with Integral Overdetermination for System of Equations of Kelvin-Voight Fluids</b> K. Khonatbek	15
<b>Effect of Strain Rate on Mechanical Properties of Pure Iron</b> W.P. Bao, Z.P. Xiong, X.P. Ren and F.M. Wang	21
<b>Determining of Corrosion Resistance of Alloyed Earth Plate produced by New Electro Deposition Method</b> M. Karimian, S. Shojaian and A. Golkar	26
<b>Analytical Solutions Using a Higher-Order Refined Theory for the Static Analysis of Functionally Graded Material Plates</b> K. Swaminathan and D.T. Naveenkumar	30
<b>Digital Studying of Surface Groove on the Pipe Hydroforming Process in Cross Shaped Joint Production</b> M. Kahrizi	36
<b>Cross Shaped Hydroforming Process Comparing of Finite Element Method and Practical Works</b> M. Kahrizi	41
<b>Iron Oxide Materials for Positive Electrodes of Lithium and Lithium-Ion Batteries</b> A. Klenushkin, B. Medvedev, Y. Kabirov and M. Evdokimov	46
<b>Dielectric Spectrum of <math>\text{CaCu}_3\text{Ti}_4\text{O}_{12}</math> from the Giant Permittivity to its Negative Values</b> Y. Kabirov, V. Gavrilachenko, E. Panchenko, E. Milov and A. Klenushkin	52
<b>Biomolecule-Assisted Synthesis of CoS Microclusters with Well-Aligned Nanoflakes</b> M. Wang, Z.Q. Wang, Y.C. Chen and Y.L. Min	56
<b>Fabrication of Nanoporous Copper Electrodes for Electrocatalytic Oxidation of Methanol</b> W. Zhang, L.J. Li, G. Jia, J. Li, Z.Z. Cao, H. Wang, C.H. Li, Y.C. Liu, Y.F. Gao and J.R. Liu	60
<b>Magneto-Elastic and Mechanical Properties of <math>\text{Fe}_{81-x}\text{Ni}_x\text{Ga}_{19}/\text{Si}(100)</math> and <math>\text{Fe}_{81-y}\text{Ni}_y\text{Ga}_{19}/\text{Glass}</math> Films</b> S.U. Jen, C.C. Liu and C.Y. Chuang	66
<b>Quantitative Analysis of Overlapping X-Ray Fluorescence Spectra for Ni, Cu, Zn in Soil by Orthogonal Signal Correction and Partial Least Squares Algorithm</b> W. Zhang, Y.J. Zhang, D. Chen, R. Zhang, X.Y. Yu, Y.W. Gao, C.L. Wang, J. Liu, N.J. Zhao and W.Q. Liu	70
<b>Time-Dependent Behavior of High Performance Fiber-Reinforced Concrete</b> A. Sprince, A. Korjakins and L. Pakrastinsh	75
<b>Photothermal Response in Semiconducting Microcantilevers Produced by Laser Excitation</b> Y.Q. Song and X.G. Yang	81
<b>Interfacial Crack Effect on Thermal Mechanical Behavior of Solder Bump for Flip-Chip Package: A Numerical Analysis</b> Y.P. Mu, W.G. Jiang and H.P. Zhao	85
<b>Dynamic Analysis of Steel and Dural Drill Rods</b> L. Khajiyeva, A. Sergaliyev and A. Umbetkulova	91
<b>Phase Transition Study of <math>\text{CaB}_6</math> under High Pressure</b> J. Wang, G. Peng and B.J. Wu	97
<b>Thermal Degradation of Epoxy Resins Containing Copper Compounds</b> Q.J. Dai and M. Gao	101

<b>Thermal Degradation of Hemp Treated with Guanidine Carbonate</b> Q.J. Dai and M. Gao	106
<b>Numerical Simulation of Small-Scale Explosion in Dry Sand</b> Y.Q. Ding, W.H. Tang, X.W. Ran and X. Xu	110
<b>Synthesis of PMMA-b-PS Block Copolymer by Emulsion ATRP and its Self-Assembly Property</b> B.Y. Tian, E.J. Tang, M. Yuan, R.X. Hao, C.M. Li, F. Bian and L. Li	115
<b>Fabrication, Characteristics and Application in Dye-Sensitized Solar Cell of Vertically Aligned ZnO Nanorod Arrays Guided with Polyethyleneimine via Hydrothermal Method</b> M. Saleem, L. Fang, F. Wu, L.W. Jun, C.L. Xu and S.J. Xue	120
<b>Nanostructured Graphenes and Metal Oxides for Fuel Cell and Battery Applications</b> Z.F. Li, J. Xie, L. Stanciu and Y. Ren	126
<b>Interfacial Behaviors of Vacuum Brazed Joint between Diamond Grit and Ni-13Sn-28Cr Filler Alloy</b> J.O. Ham, J.H. Chung, S.K. Jung, Y.M. Byoun and C.H. Lee	132
<b>Formation of Polymer Brushes with Diblock Copolymers on a Planar Surface</b> Y. Yang, C.C. Zuo, Y.X. Zuo and Y. Yu	143
<b>Molecular Dynamics Simulation on Dynamic Properties of Bubble</b> C. Qiu and H.C. Zhang	150
<b>Experimental Study of Gas Humidity on the Dielectric Barrier Discharge Influence</b> Y.H. Liang and G.J. Cheng	157
<b>Tanjung Bin Coal Bottom Ash: From Waste to Concrete Material</b> A.U. Abubakar and K.S. Baharudin	163
<b>Characristics of Shape Memory Composites Combined with Shape Memory Alloy and Shape Memory Polymer</b> X. Feng, L.M. Zhao and X.J. Mi	169
<b>An Eigenexpansion Method in 2D Viscoelastic Materials</b> L. Chen and F. Yuan	173
<b>Metal Flow Velocity in an Intake Port in the Process of Die Casting</b> S. Gaspar and J. Pasko	177
<b>Integrative Analysis of the Injection Molding Process and Mechanical Behavior of Plastic Part</b> Q.W. Zhang, Y.J. Xu, W.H. Zhang and J. Wang	181
<b>Effect of <i>Galla chinensis</i> on the Wear Resistance of Dentine</b> H. Li, M. Deng, S.C. Peng and J.H. Shi	187
<b>Kinetics and Distribution Clusters of Damage in Loaded Materials: Simulation with Probabilistic Cellular Automaton</b> G.A. Kazunina and D.V. Alekseev	191
<b>Characteristics of Electrochemical Machining Passive Films on Stainless Steel S304</b> Z.F. Wei, X.H. Zheng and N. Ma	197
<b>Experiment Study of Pulse Electrochemical Finishing of GCr15 Bearing Steel</b> X.H. Zheng, Z.F. Wei and S. Huang	203
<b>Stress Intensity Factors and Weight Function for Internal Surface Faults in Cylindrical Vessels</b> Y.L. Ni, S.T. Yang and C.Q. Li	209
<b>Mechanical Properties Analysis on Honeycomb Sandwich Structure Considering Flexural Rigidity of Face Sheets</b> X.X. He, Y. Liao and X.J. Liang	216
<b>Study of Solidus Velocity on Porosity Formation in A201 Aluminum Alloy Castings</b> Y.S. Kuo	223
<b>The Experimental and Numerical Investigation on the Mechanical Properties of Metallic Foil</b> H.M. Zhang, X.H. Dong, Q. Wang and F. Peng	228

## **Chapter 2: MEMS and Mechatronics, Image Processing and Applications**

<b>Using the Theory of Spline Function to Implement the Optimal Dispatch for Mechanical Arm</b> S.J. Ma	237
<b>Thermoelastic Damping in Laminated Composite Circular Microplate Resonators</b> W.L. Zuo, X.D. Liu and P. Li	241
<b>Analytic Model and FEM Characterization of Two Piezoresistive Microphone Membrane</b> P. Luca and O. Per	248
<b>Research on a Wavelet Filtering Method of the Fiber Optic Gyroscope Based on EMD</b> B. Zhou and W. Wang	253
<b>Design Optimization of MEMS Based LLC Tunable Resonant Converter for Power Supplies on Chip</b> F. Khan, Y. Zhu, J.W. Lu and D. Dao	258
<b>A Novel Bidirectional Z-Shaped Thermally Actuated RF MEMS Switch for Multiple-Beam Antenna Array</b> J. Pal, Y. Zhu, J.W. Lu and D.V. Dao	264
<b>Microfabrication and Characterization of Stack Coupled Inductor Coils for Magnetic Sensors and Actuators</b> J. Yunas, Y.M. Burhanuddin and E.P. Roer	270
<b>Comparative Study of Top Electrode and Bottom Electrode Sensing Resistor Schemes for MEMs Based Bolometer Application</b> J.F. Feng, X.X. Kang, C. Yuan, Q.Y. Zuo, S.M. Chen and Y.H. Zhao	275
<b>Design and Study of Magnetization Characteristics of a Magnetostrictive (<math>\text{Tb}_{0.3}\text{Dy}_{0.7}\text{Fe}_{1.95}</math>) Actuator under Zero Pre-Stress Conditions for Direct Current Input</b> R. Joshi and R. Kadoli	281
<b>MEMS Accelerometer Design Optimization Using Genetic Algorithm</b> V.S. Krushnasamy and A.V. Juliet	288
<b>Perspective of Parallel Simulation in Mechatronic Systems - Metal Cutting</b> R. Dubovská, P. Kvasnica and I. Kvasnica	295
<b>Design and Verification of a "Soft" eFPGA Using New Method</b> X.D. Xie, P. Li and W. Li	301
<b>Designing and Performance Assessment for Sensor Color Interpolation</b> G.G. Jeon	307
<b>A Research on X-Trans Patterned CMOS</b> G.G. Jeon	313
<b>Efficient Color Configurations for Sensors</b> G.G. Jeon	319
<b>A Soft Decision Making Model for Detail Preservation</b> G.G. Jeon	323
<b>Optimal Bit Plane Arrangement for Image Size-Performance Tradeoff</b> G.G. Jeon	327
<b>Electromechanical Properties of Vertically Aligned Carbon Nanotube</b> A. Rashidi, M. Omid, M. Choolaei, M. Nazarzadeh, A. Yadegari, F. Haghierosadat, F. Oroojalian and M. Azhdari	332
<b>Clustering in Wireless Sensor Networks: Performance Comparison of EAMMH and LEACH Protocols Using MATLAB</b> M.R. Mundada, N. Thimmegowda, T. Bhuvaneswari and V. Cyrilraj	337
<b>Embedded System for Detection, Recognition and Classification of Traffic Signs</b> D.V. Correia and P.D. Gaspar	343
<b>Design and Research of Low-Energy Consumption Sensor Nodes in a Smart-Scene System</b> C.X. Fan, R. Li, J.W. Zou and Y.Q. Wang	352
<b>Design and Manufacture of Ultra-Small Chip Power Inductor</b> C.X. Chen and Y.H. Mao	359
<b>Experimental Investigations upon the Electrical Resistance of Microcontacts</b> M. Glovnea and C. Suciuc	365
<b>The Study on Disturbing Force of Dynamic Mechanical Systems Using Kalman Filter Techniques</b> Z. Jing	371

<b>Fault Current Limiter Based on Series Voltage Source Inverter</b> H. Li, D.M. Han and L.Q. Zeng	378
<b>Investigation of Dynamical Peculiarities of Manipulator on the Basis of close Circuit Mechanism</b> K.A. Tuleshov, A.K. Ozhikenov and K.A. Ozhiken	386

### **Chapter 3: Design, Modelling in Manufacture and Manufacturing Technologies**

<b>A New Approach for Modeling Electro-Osmotic Flow Micro-Cooling Systems</b> A. Taklifi and A. Aliabadi	393
<b>Design of a Total Monitoring System for Air Drilling Process</b> H. Jiang, H.X. Wang, W.J. Lan and J. Zhang	400
<b>Numerical Study of the Effect of Propellers Skew on Cavitation Performance</b> Z.F. Zhu	405
<b>Finite Element Analysis of Rubber Sealing Ring Resilience Behavior</b> J. Qu, G. Chen and Y.W. Yang	410
<b>Determination of Attack Angle and Tilt Angle of a Cutting Pick</b> Y. Sun and X.S. Li	415
<b>Methodology for Determining the Propagation Speed of the Hydraulic Shock in the Pipes</b> L. Topliceanu, A.S. Ghenadi and L. Bibire	419
<b>Modeling and Analysis of Size Effects on Pure Copper Mechanical Behaviors in Micro Scale Plastic Deformation Processes</b> Q. Wang, X.H. Dong, H.M. Zhang and F. Peng	424
<b>Shape Optimization of 3D Mechanical Systems Using Metamodels</b> A. Janushevskis, A. Melnikovs and A. Boyko	429
<b>Numerical Simulation of Dust Dispersion in 5 L Vessel</b> J.C. Chen, Q. Zhang and Q.J. Ma	436
<b>An Approach to Determine the Maximum Rate of Pressure Rise for Dust EXPLOSIONA</b> Q.J. Ma, Q. Zhang and J.C. Chen	442
<b>Process Design of Composite Concrete for CNC Machine Tool Bed</b> J.M. Ding, G.F. Zhou, H. Cheng and X. Li	448
<b>Green Redesign of CKA6150 Numerical Control Lathe</b> J.M. Ding, C.C. Zhang and Y. Liu	454
<b>Large Deflection Analysis of Non-Hinged Arch</b> J.W. Zhang, S.W. Liu, H.M. Liu, T.B. Liu and J.C. Zhao	459
<b>Insight in the Performance of Scramjet Combustor Based on Orthogonal Experimental Design</b> W.Q. Cheng, J.Y. Liu and R. Shrestha	463
<b>Development Trends and Future Prospects of Cut-to-Length Machinery</b> Y. Gerasimov, A. Sokolov and V. Syunev	468
<b>Inversion Algorithm Based on the Unscented Kalman Filter for Inverse Heat Conduction Problems</b> P. Chu	474
<b>Study on the Key Technology for Large-Scale High-Performance CNC Vertical Broaching Machine</b> G.J. Chen, J. Ni, T.T. Liu, M. Xu and L.G. Lin	483
<b>Design, Construction and Evaluation of a Smart Agricultural Harvester</b> M.N.A. Ghani, R.M. Hudzari, F.I.A. Wahab, M.R.H. Ramli and A.W.M. Azhar	487
<b>Engineering Technological in Agriculture Research and Education</b> R.M. Hudzari, M.M. Noorman, M.N.N. Asimi, M.A.M. Atar and M. Nashriyah	493
<b>Further Discussion on Population Growth Models by Stochastic Differential Equations</b> F. Yang, L.D. Zhang and J.F. Shen	499
<b>Research on Inertia Projecting Devices to Eject Water Column for Hydraulic Impact Tests</b> X.J. Liu, X.L. Wang, S.Z. Li, W.Z. Zhong and B.Q. Zhou	504

<b>Research on Circuit Design for Speed Adjusting Hardware of Brushless DC Motor Based on the Two-Dimensional Fuzzy Controller</b> C.F. Li, K.M. Li and X. Zhang	509
<b>Analysis and Computation of Taper Leaf Spring Based on FE Contact Analysis</b> S.T. Zhou, H.W. Huang, L.G. Ouyang and T.M. Xiang	516
<b>Modified Differential Evolution for Tension/Compression String Design Problem</b> L. Jian, C.J. Yin, S. Hirokawa and Y. Tabata	523
<b>Research on Control of Heat Flux Environment Simulation for High-Speed Aircraft</b> D.F. Wu, Y.W. Wang, S. Wu, J.L. Yang and Z.T. Gao	528
<b>Virtual Health Monitoring System for Wing Structure</b> F.Y. Wan and Z. Qin	534
<b>Rigid Body Motion Conversion due to Collision</b> S. Polukoshko	540
<b>Optimal Control of the Rotor System Motion</b> I. Toleukhan	546
<b>Parameters and Applications of Noise-Gates</b> Y. Jin	553

## **Chapter 4: AI in Design Engineering, Information Technologies Applications**

<b>Research on the Mean Shift Target Tracking and Recognition Technology Based on Multi-Feature Fusion</b> Y.J. Peng, F. Tan and J. Sun	561
<b>A Summary of Research on the Linux Operating System</b> Y.J. Wang	565
<b>A New Method of Time Series Piecewise Linear Representation</b> Q. Wang	569
<b>Pulse Exposure Timing Control Mechanism of X-Ray Machine</b> H. Xiao and J.H. Cheng	574
<b>Detection of the Network Intrusion under IPV6</b> Y. Shen and W.H. Zhu	579
<b>The Real-Time Interactive Smart Energy System Based on the Internet of Things and Cloud Computing</b> L. Chen, Y. Wang, S.W. Yang, X.P. Gu and Y. Xu	584
<b>A New Type of Function Projective Synchronization of Nonautonomous Chaotic System</b> X.S. Zhao, Z.B. Li and F.F. Liu	590
<b>The Geomagnetic Chart's Drawing Based on Normal Kriging Method</b> X.J. Zhang, C. Kang, Y.C. Zhao, Y.Y. Liu, L.M. Fan and Y. Lei	596
<b>Placement Optimization of Smart Piezoelectric Rods for Shape Control of Large Cable- Network Antenna Structures</b> W. Liu and D.X. Li	602
<b>Analytic Solution for Microscale Poiseuille Flow Based on Super-Burnett Equations</b> C.Q. Song, X.Y. Yin and F.H. Qin	609
<b>Research on Siemens PLC Pulse Control</b> L.X. Wang, Z.R. Feng and R.Y. Zhang	616
<b>The Realization of the Source Address Validation Improvement (SAVI) in IPV6 Campus Network</b> Y.F. Lou and Z.J. Yuan	621
<b>A Design Scheme of Operating System to Run Windows' Application Programs on Linux Platform</b> Y.J. Wang	627
<b>A Floorplanning Algorithm with Minimum Total Length Wires</b> H.Y. Yang and H.A. Zhao	630