Applied Mechanics, Materials and Manufacturing IV

Selected, peer reviewed papers from the 4th International Conference on Applied Mechanics, Materials and Manufacturing (ICA3M 2014, ICAMMM 2014), August 23-24, 2014, Shenzhen, China

von Huawu Liu

1. Auflage

Trans Tech Publications 2014

Verlag C.H. Beck im Internet: www.beck.de ISBN 978 3 03835 288 4

Table of Contents

Preface and Conference Organization

Chapter 1: Nanomaterials Science and Technology

The Function of PEG in the Synthesis of Nanomaterials Q.W. Zhu and M.G. Ou	3
Typical Solid State and Wet Chemistry Methods to Prepare Nano-Sized Nickel Ferrite Particles H. Qu and S.Q. Liu	7
Robust Design of Using MWCNTs in Minimum Quantity Lubrication W.T. Huang, D.H. Wu, S.P. Lin and J.T. Chen	11
Synthesis of TiO ₂ @Ag Nano-Composite Particles Using Pulsed Laser Gas Phase Evaporation-Liquid Collection S.Y. Chen, J.H. Wang, X. Zhou, J. Liang and C.S. Liu	22
The Synthesis and Characterization of Oxide Free Tin Nanoparticles Z.L. Pan, S.L. Ao and J.P. Jia	26

Chapter 2: Metals and Alloys

Hot Deformation Behavior and Microstructure Evolution of Extruded 6069 Al Alloy under Tension	
H.Y. Wu, M.C. Lin, F.J. Zhu, C.T. Wu, C.H. Liao and C.H. Chiu	33
Study of N-1L Corrosion of Carbon Steel in Acidic Desulfurizer Performance S.D. Wang, Q. Wang, J. Li and S.L. Zang	37
Surface Crack and Organization of Hot Rolled S31803 Duplex Stainless Steel Bars M.H. Wu, Z.Y. Liu and H. Yang	41
Comparison Research on Mechanical Properties of High Temperature Alloy after Laser Peened and Ultrasonically Peened X.J. Shen, C. Wang, D. Sun, Z.L. Lai and D.Y. Yao	46
Effect of Laser Shock Peening on the Structure and Prosperity of K403 Alloy Y. Chai, W.F. He, G.Y. He and Y.Q. Li	52
Effects of Different Heat Treatments on Transformation of Residual Austenite in Bearing Steel H.S. Liu, M.H. Wang, X.Y. Ge and H.S. Luo	56
Influence of Ultrasonic Treatment on Welded Joint Fatigue Performance in JG590 Steel J.S. Sun and H.G. Sun	61
Microstructures and Properties of HAZ of JB800 Bainite Steel J.S. Sun and H.Q. Wang	65
Study on the Corrosion Electrochemical Behaviors of Three Kinds of Metal in Eutrophic Fresh Water G. Cao, D.S. Xia and L. Sun	70
The Effect of Water Vapor on Thermal Oxide Grown on Inconel 690 A. Srisrual, J.P. Petit, Y. Wouters and A. Galerie	74
Investigation of Material Behavior of TRIP Steel by Macro and Micro Multiscale Simulation J.H. Li and Z.J. Yu	82
Critical Cooling Rate of Y ₃₆ Nd ₂₀ Al ₂₄ Co ₂₀ Bulk Amorphous Alloy S.W. He	86
Predicting the Influence of Microporosity on the Mechanical Properties and Fracture Behavior of High-Pressure Die-Cast AM50 Magnesium Alloy X. Sun, Z.Y. Cao, H.F. Liu, W. Jiang and L.P. Liu	90
Research on Hardness for Low-Alloy Steel after Fire Damage C. Wang, J. Chen and Y.P. Wang	95

Chapter 3: Optical and Magnetic Materials, Semiconductors and Technology

Study on Band Gap Varying of Diamond Photonic Crystals by Fabricating to Bring the Error of Dielectric Volume Fraction	
S.B. Chen, Y.S. Yao, X.H. Li and M.J. Wang	101
Wide Absolute-Photonic-Bandgap 2D Square-Lattice Photonic Crystal Based on Hollow Cylinders and Cross Connecting Plates J.J. Wang, Z.B. Ouyang, G.H. Wen, H. Huang, M. Lin and Q. Wang	105
A Two-Dimensional Square-Lattice Photonic Crystal with Rotated Square Cylinders and Cross Thin Plates Exhibiting Wide Photonic Bandgap G.H. Wen and Z.B. Ouyang	109
Comparative Studies of Multiferroic BiFeO ₃ Powders Prepared by Hydrothermal Method versus Sol-Gel Process X.Y. Zhang, X.W. Qi, Z.Y. Yang and R.X. Zhong	113
Growth of Mo Thin Films on Flexible Polymer and Metal Foil Substrates for Solar Cell Application J.X. Xu	117
High Permittivity and Varistor Properties of SnO₂-Zn₂SnO₄ Composite Ceramics H.H. Liu, L.B. Li, G.Z. Zang, J.X. Cao and Y. Li	121
Preparation and Application of Grapheme L. Liu and C.C. Zhou	127

Chapter 4: Composite Materials and Applications

A Study of Linear versus Kinked Bulky Polymers for Proton Exchange Membranes Using Sulfonated Polyimides Y H Li	133
Characterisation of Low-Temperature Co-Firable Green Tapes for Making Fused Silica	155
Laminated Composites X.G. Miao, Y.Y. Shi, W.J. Zhu, L. Luan and C.L. Ji	137
Study on Thermal Stability Properties of Epoxy Matrix/Fluorine and Silicon Composites Q. Lin, Z.J. Song and J.L. Xie	143
Synthesis and Characterization of Polyacrylic Acid/Xanthan Gum/Bentonite Superabsorbent Polymer	
D.D. Hou, S.L. Ding, B.H. Xu, X.R. Chen and X.Y. Shen	148
Thermal Strength of Adhesion Bond V.I. Andreev and R.A. Turusov	153
Effect of Fiber Orientation on Vibration Characteristic of Composite Laminated Plates H.F. Peng, C. Wang and P. Wang	158
Preparation of the Carbon Fiber/Cu Alloy Matrix Self-Lubricating Composite Materials S.Y. Chen, X.R. Li, Y.N. Bi, D. Wellburn, J. Liang and C.S. Liu	164
Mechanical Properties of Automotive Instrument Panels with Semi-Rigid Foam R. Cheng	168
Study on Transverse Shear Behavior of CFRP Sandwich Structure with M-Pattern Folded	
Core L.X. Cong and Y.G. Sun	173
The Outdoor Aging Properties of Polypropylene/Mica Composite Y.J. Wu and C.P. Yang	177
The Utilization Efficiency of Natural Alumosilicates in Composite Binders N.I. Kozhukhova, E.V. Fomina, I.V. Zhernovsky, V.V. Strokova and R.V. Chizhov	182

Chapter 5: Chemical Materials and Technologies for Chemical Engineering

A Comparative Study on Silica Sands as Absorbents for the Removal of Hexavalent Chromium Ions from Aqueous Solutions Y. Zhang and S.Q. Liu	189
Diversity of Cell Wall Composition and Saccharides Production with H ₂ SO ₄ Pretreatment in Bioenergy Material: <i>Miscanthus</i>	107
N. Xu, B.L. Dai, Z. Wu, F.H. Mu and J.M. Xu	193
Dyeing of Mulberry Silk Using Natural Safflower Yellow Pigment Y.M. Jia and H.W. Jiang	197
Effect of Heat Treatment Process on the Preparation of Foamed Glass Ceramic from Red Mud and Fly Ash	
Y.X. Guo, Y.H. Zhang, H.W. Huang and P. Hu	201
Effect of Heating Rate on the Deinking Sludge Pyrolysis Character Y.Y. Wang, J.C. Chen and G.H. Yang	205
Laboratory Permeation Tests of PS for Solidification of Relic Soils in Humid Circumstances X.J. Chai, P.H. Chen, C.F. He and C.X. Rao	209
Structural Analysis of Lignin and its Thermal Performance under Supercritical Water Conditions	
W.K. Jiang, Y. Liu, G.J. Lyu, G.H. Yang and C. Wang	213
Study on ELISA Plates Modified with Methylacrylic Acid by ⁶⁰ Co Irradiation D. Chen and H.S. Wang	219
Synthesis and Preparation of Desulfurization Concerned Naphthenic Acid Type Ionic Liquid	
Q. Wang, G.B. Li, P. Cheng, S.D. Wang and S.L. Zang	224
Use of Adsorbents for Indoor Air Purification from Carbon Dioxide M.Y. Zubkova, V.I. Maslikov, D.V. Molodtsov, A.N. Chusov and E.P. Gabdullina	229
Vibrationally Averaged Potential Energy Surfaces and Microwave Spectra for Isotopic Ne- CO ₂ Complexes	
R. Chen and X.L. Luo	235
Optimization of Sodium Carbonate Pretreatment on Enzymatic Digestibility of Bioenergy Material: <i>Miscanthus</i> N. Xu, B.L. Dai, Z. Wu, F.H. Mu and J.M. Xu	240
Polymerization of Maleic Anhydride Induced by Non-Equilibrium Atmospheric Pressure Argon Plasma	
J. Yan, K. Hosoi and S. Kuroda	244
Mechanorphore-Based Poly(Glycidyl Methacrylate) Synthesized by Atom Transfer Living Radical Polymerization	• 10
X.B. Liu and F.Y. Gong PCBs Removing in Aged Landfill Leachate by an Innovative Biofilm Reactor with Biomass	249
Carriers - <i>Luffa</i> Sponges M. Zhang and S.B. Xia	253
Research of Coal Pores and Integrity Evaluation Method Based on Fractal Theory J. Li and X. Wu	258
Synthesis and Dielectric Behavior of a New Two-Phase Percolative BaTiO ₃ -Cu/Polyimide	200
Composite Z.L. Pan, J.T. Chen, S.L. Ao and J.P. Jia	263
Immobilization of Laccase on Surface Modified Magnetic Silica Particles and its Use for the Papermaking Wastewater Y. Liu and Z. Wang	267
Microstructure and Corrosion Resistance of TiO ₂ Films on 316L Using Hydrothermal	207
Method J. Wang and L. Huang	271
Preparation Process and Mechanism of CuO-MnO₂-TiO₂-V₂O₅ in the Metallic Luster Glaze X.T. Shi, J.L. Feng, T. Zhang and X.W. Gao	275
Functions of SiO₂-Shells in Core-Shell Structured Particles H.M. Duan and S.Q. Liu	279
Development of Metallurgical Processing Technology the Titanomagnetite Concentrate of	
the Tebinbulak Deposit A.N. Dmitriev, O.Y. Sheshukov, G.I. Gazaleeva, Y.A. Chesnokov, E.V. Bratygin, I.V. Nekrasov and G.Y. Vitkina	283

Research on Efficient Polymer Dissolving Technology for Hydrophobically Associating Polymer Flooding on Offshore Platform	
Y.J. Zhu, J. Zhang, W.S. Zhao, S.S. Wang, B. Jing, F.X. Meng and H. Zhang	290
Research of Coalbed Methane Fracturing Crack Initiation and Propagation Law Y.S. Lin, X.F. Wei, X. Zhou and S. Han	295
Research of Aluminosilicate Refractorial Erosion Process on the HCL in Blast Furnace Gas B.S. Hu, X.W. Hu, Y.L. Gui and X.G. Han	300
Dyeing of Bamboo Viscose Fiber with Gardenia Yellow and Sodium Copper Chlorophyll J. Zhang, M.X. Xu and Y.J. Chen	305
The Effect Nucleating Agent on Open-Celled Morphology of Polymer in Vibration B. Li, B.S. Huang, Q.Z. Nan and X.M. Qin	309
Technical Research for Oil Well Variable Frequency Electromagnetic Field Paraffin Prevention Y.W. He	313
The Preparation Process and Mechanism of the Iron-Red Fancy Glaze under High Temperature Reducing Atmosphere	
X.T. Shi and T. Zhang	318
Large-Scale Growth of Nitrogen-Doped via Solvothermal Synthesis X.L. Chen, N. Wu, G.Z. Gou, L. Shi, S.Q. Pan and W. Liu	323
Application of Organosilicone and Gyoxal Crosslinking Agents on Tussah Silk Fabric Z.M. Liu, J.B. Hou and Y.H. Lu	327

Chapter 6: Building Materials and Construction Technology

Effects of High Added Quantity SSA-SSP-GSP on Resistance to Carbonation of Concrete C.P. Pan, X. Li, X.X. Lv, S.J. Ge and J.L. Shang	333
Evaluation the Strength of Cement Systems, Modified by Accelerators A. Adamtsevich, A. Pustovgar, S. Pashkevich, A. Eremin and A. Zhuravlev	339
Experimental Study on Seismic Performance of AAS-CFST Column W.F. Chen, X.H. Yuan and B. Li	344
Humidity Conditions of Homogeneous Wall from Gas-Concrete Blocks with Finishing Plaster Compounds N. Vatin, A. Gorshkov, D. Nemova, O. Gamayunova and D. Tarasova	349
Mathematical Modelling of Thermo-Hydro-Mechanical Behaviour for Concrete under Elevated Temperature	549
S.B. Zhang, X.C. Wang and X.P. Shen	355
Nonstationary Thermal Conduction through the Building Envelope N. Vatin, A. Gorshkov, P. Rymkevich, D. Nemova and D. Tarasova	365
Performance of Acrylic in the Large Architectural Installation L.X. Li, R. Qian and A. Li	370
Research on the Effect of Prehydration of Portland Cement Stored in Normal Conditions A. Adamtsevich, A. Eremin, A. Pustovgar, S. Pashkevich and S. Nefedov	376
The Research on the Hysteresis Curve Shape Characteristics of Frozen Soil L.Z. Cui, G.M. Li, L.D. Qiu, Y.T. He, L. Mao and F. Luo	382
Experimental Study on Comparison about the Modifiers of Rubber Cement Concrete W. Li, Z. Huang, X.C. Wang and J.W. Wang	387
Mechanism Research of Drying Shrinkage of Cement Pastes Based on the Contact Angle K.W. Song, G.F. Chen, H. Zhang, C.L. Shi and J. Yang	391
Study on Tension and Compression Ratio and Discount Ratio of Rubber Modified Silica Fume Concrete	
W. Li, Z. Huang, X.C. Wang and J.P. Zhang	396
The Conventional Triaxial Compressive Test of Plain Reactive Powder Concrete X.F. Wang and Y.P. Wang	401
Influence of Several Calcareous Compounds on the Performance of Sulphoaluminate	
Cement Paste Y. Tong, J.N. Zhang, L. Wang, M. Li and W.J. Zhao	407

Kinetics of Mechanical Activation during the Manufacturing Process of Nanostructured Binders	
M.N. Kapusta, V.A. Kobzev and V.V. Nelubova	412
The Structure Design of Continuously Reinforced Concrete Pavement in Shi Ji Road M.H. Zhou, J.M. Yang and M. Zheng	417
The Enhancement Effect of Hydrated Lime on Glassphalt Concrete Y.P. Liao, H.S. Wu and L.Z. Yi	423
Deformation Characteristics of Concrete under Uniaxial Compression G.J. Liu	428
Experimental Study on Evolution of Rock Damage Rule in the Condition of Conventional Three Axis Compression B. He	432
Influence of Silica Fume on High-Performance Concrete	
F. Wang, S.S. Zheng and X.F. Wang	437
Research on Mechanism of Concrete Creep G.J. Liu	441
Research Status of Concrete Strength Theory Based on Stress and Strain G.J. Liu	445
Study on the Cooling Effect of Zeolite Powder to High Viscosity Asphalt Mixture X.R. Wu and S.X. Li	449
The Eco-Concrete with the Papermaking Sludge M.Y. Kon and L.H. Chou	454
Energy-Efficient Vibratory Feeder of Bulk Construction Materials A.D. Ishkov, A.V. Stepanov, S.V. Miloradov and I.V. Voronina	458
About Application Prospectivity of Rocks with Different Geological and Morphological Features as Basic Raw Component for Free-Cement Binder Production N.V. Pavlenko, V.V. Strokova, M.N. Kapusta and D.D. Netsvet	462
Influence Analysis of Cold Formed Steel Members on Thermal Characteristics of Building Envelopes	
G. Kashevarova and P. Kosykh	466
The Research Reviewed of Subway Construction Impact on Stratum Deformation Law X.G. Zhu	474
Chapter 7: Technologies of Material Processing	
A Multi-Functional Resistance Furnace for Industrial Thermogravimetric Analysis H. Liu, D.D. Guo, T.S. Song and S.Q. Liu	481
Analysis for Transverse Knurling Process of the Assembled Camshaft P. Zhang, S.Q. Kou, H. Zhu and W.C. Liang	485
Cutting Tool Run out Considered Cutting Force Estimation in Micro Milling Processes J.C. Liu, Y.L. Su, Z.G. Dong and G. Ya	490

Development and Application of Test Apparatus for Cutting Performance of Cutters of	
Large Excavation Equipment P.L. Wang, Y.M. Xia, T. Ouyang, L. Tang and B. Guo	497
Effect of Different Machining Parameters on Time-Dependent Flatness W. Yi, Z.L. Jiang and Z. Li	502
Effect of Temperature on the Mechanical Property of the Film-Substrate Interface of Diamond Coatings	
X.G. Jian and Y.H. Zhang	506
Fabrication of Microstructure on Nickel Template by Femtosecond Laser L. Zhang, X.W. Cao, S.G. Li, R.Y. Xiang and H.C. Sun	512
Flank Wear Mechanism of WC-5TiC-10Co Cemented Carbides Inserts when Machining HT250 Gray Cast Iron	
J. Chen, M.F. Gong and S.H. Wu	517
Groove Deformation on a Heat Resistant Alloy due to Thermal and Thermo-Mechanical	

Cycling F.X. Li

d

Mirror Grinding Process Parameter Selection and Design L. Hua, X.J. Wang and R. Zhou	526
Monitoring and Analysis of the Process of Conductive Heating Turning T.H. Shen, X. Wang and T.Y. Zhang	529
Performance of a Waterproof Glass-Ceramic Coating W. Zhang, T. Yang and S.Q. Liu	535
Research on the High Temperature Oxidation Stress of Thermal Barrier Coating Z.Y. Han and Z.Z. Jing	539
Simulation of Grinding Surface Roughness by End Face Grinding Wheel with Phyllotactic Abrasive Pattern	
X.S. Li, M.L. Shao, J. Wang and Y.S. Lu	543
Surrogate Modeling and Optimizing for CCP Etch Process W.R. Duan and L. Tian	548
Microstructures and Wear Resistance of Iron-Based Protective Coatings by Supersonic Arc Spraying	551
S.S. Li, T.Q. Liang, X.F. Yang and C.H. Zhao	554
Influences of Pulse Frequency on Structure and Mechanical Properties of DLC Films Synthesized by Pulsed Cathodic Arc Evaporation B. Ye, X.H. Jiang, B. Zhou, D.G. Piliptsou and A.V. Rogachev	560
Research on Compound Forming of Outside 3D Integral Fin on Stainless Steel Tube X.X. Zhang and X.L. Qiu	565
Research on Surface Treatment Technologies of Ti6Al4V Alloys Y. Liu, S.W. Yao, H.B. Ke and Z.Y. Liu	569
Corrosion Properties of Friction Stir Welded 2024 Aluminum Alloys Z.Z. Chen, M.M. Wu and Y. Xiao	573
Research on Electrode Design and Computer Simulation of Manufacturing Shrouded Turbine Blisk by EDM	
Y. Li, L.J. Zhai and J.Y. Liu	577
Uniaxial and Biaxial Tensile Properties and Resilience of a Weft Knitted Modal Fabric Z.Y. Ma, J.H. Jiang, D.F. Zhuo and N.L. Chen	582
Diameter Real-Time Computing of Uncoiler/Coiler Machines Based on the S7-300 H.P. Wang, H.P. Chen, Y.T. Zhu and D. Hu	586
Preparation and Performance of Crack-Free Silica Film on Glass Substrate S.X. Niu and S.Q. Liu	592

Chapter 8: Applied and Computational Mechanics in Designing and Research

A Study on Solving the Seepage Flow Model of Three-Area Composite Reservoir X.X. Dong, S.C. Li, D.D. Gui and F.J. Zhang	599
Aerodynamic Analysis of the Rotor/Wing in Conversion Flight J.H. Wu and J. Hu	604
Aerodynamic Characteristics of an Airfoil with Boundary Layer Ingestion in Subsonic Flow J.H. Wu and X.M. Li	609
Comparative Numerical Simulation of Natural Convection in a Porous Horizontal Cylindrical Annulus J. Belabid and A. Cheddadi	613
Conformal Invariance and Conserved Quantity of Mei Symmetry for Appell Equations in a Holonomic System with Mass Variable Y.Y. Zhang, X.T. Sun, X.C. Xue and L.Q. Jia	617
Control Problems for the MHD Equations under Inhomogeneous Mixed Boundary Conditions R. Brizitskii and D. Tereshko	626
Effect of Wall Thickness of Hollow Sphere on the Stress Distribution of Random Hollow Sphere Syntactic Foam Z. Chen, Z. Zhou and B.Y. Jiang	630
Equilateral Triangle Grid Cylindrical Shell Parametric Design X.Y. Lu, Q.S. Wang, X.W. Zhao, S.B. Lu, F.C. Liu, J. Xin, R. An, X.Z. Liu, Y. Su and L. Li	634

е

Fault Analysis of Journal Bearing Considering the Turbulent and Thermo-Hydrodynamic Effects	
G.H. Xu, J. Zhou, H.P. Geng and M.J. Lu	638
Finite Poroelasticity with Surface Effect C.J. Li and J.L. Feng	646
High Arch Dam Reservoir Basin Deformation & Effect on Dam Operating Status E.F. Zhao, Y.F. Jiang and Y.L. Gu	651
Hydrocyclone Numerical Simulation and Separation Efficiency Optimization X.M. Sun and L. Wei	655
Immersed Boundary Lattice Boltzmann Method to Simulate Fluid Flows with Flexible Boundaries	
Y.G. Chen and L. Wan	659
Influence of Cylindrical Inclusion on the Elastic Field of Soft Material Loaded by Wedge Indenter X.H. Tan, W. Qiu and X. Xiao	664
Numerical Investigation of the Minimum Roof Thickness of Mining Stope in Bailing Copper-Zinc Mine	004
J.F. Ma, X.L. Zhang, Y.Y. Jiao and H.N. Tian	668
Numerical Simulation of Groundwater Flow in Strata with Argillation Weak Permeable Media in Long Deep Buried Tunnel Site Y.E. Deng, X. Peng and H.H. Jiang	674
Similar Constructive Method of Solution for the Nonlinear Percolation Model in Composite Reservoir	074
F.J. Zhang, X.T. Bao, S.C. Li, D.D. Gui and X.X. Dong	678
Sliding Mode Control for Spacecraft Large Angel Attitude Control with Fuel Sloshing X.J. Song and B.Z. Yue	683
Square Pyramid Partial Double Layer of Schwedler Spherical Reticulated Shell Parametric Design and Mechanical Analysis	(07
X.Y. Lu, F.C. Liu, D.L. Zhang, Q.S. Wang, B.L. Shao, J. Xin, R. An and X.Z. Liu Superficial Discussion on New Framework of Static Equilibrium X.M. Zhang, L.B. Zhu, A.W. Wang, S.H. Yang and M.Y. Hu	687 691
The Establishment of Ninety Degree Gas Elbow Pipes Internal Pressure Distribution Model X.Y. Lu, Y. Zhou, S.Y. Chen, X.G. Li and H.L. Zhu	696
The Influence of the Flight Aerodynamic for Interactions of Wings and Body of the	090
Honeybee H.Y. Zhao, P.F. Zhang and Y. Ma	700
The Influence of Upstream Flow Angle Variation on Intermediate Turbine Duct Y. Wang	705
Establishment and Simulation of Nonlinear Dynamic Model of Finished Automobile L.Y. Li	709
Falling Simulation of Free-Standing Museum Cultural Relics Supported by Soft Pad Q. Zhou	715
Modified Wavelet-Based Multilevel Discrete-Continual Finite Element Method for Local Structural Analysis - Part 1: Continual and Discrete-Continual Formulations of the Problems	
P.A. Akimov, M.L. Mozgaleva, M. Aslami and O.A. Negrozov	720
Modified Wavelet-Based Multilevel Discrete-Continual Finite Element Method for Local Structural Analysis - Part 2: Reduced Formulations of the Problems in Haar Basis P.A. Akimov, M.L. Mozgaleva, M. Aslami and O.A. Negrozov	724
Research on Horizontal Well Hydraulic Fracture Crack Initiation Law of Low Permeability	121
Reservoir S.L. Wang, Y. Zhang, G.F. Zhao, S.Q. Wang and S.R. Zhang	728
Identifying Real Stiffness Properties of Structural Elements of Adapted Finite-Element	120
Models of Buildings and Structures - Part 1: Problem Setting P.I. Novikov	732
Identifying Real Stiffness Properties of Structural Elements of Adapted Finite-Element Models of Buildings and Structures - Part 2: Computational-Experimental Methodology A.M. Belostotskiy and P.I. Novikov	736

Identifying Real Stiffness Properties of Structural Elements of Adapted Finite-Element Models of Buildings and Structures - Part 3: Approbation of Experimental Methodology P.I. Novikov and A.M. Belostotskiy	742
Numerical Simulation for Flow over Two Circular Cylinders in Micro Channel with Lattice Boltzmann Method Z.J. Gong, J. Yang and W.F. Wu	747
Study on Vortex Evolution Processes of Transient Driven Flow in a Square Cavity S.H. He, L.X. Zhang, J.M. Hu and C.Y. Shen	751
The Segment Loading Static Finite Element Analysis on the Mobile Refuge Chamber A.N. Zhang and Y.M. Gu	755
The Buckling Analysis of Drill String in Inclined Wellbore with a Concave Curved Geometric Defect B.K. Zhu	759
Calculation of Long Span Structures to Seismic and Accidental Impacts in Nonlinear Dynamic Formulation V.I. Andreev, O.V. Mkrtychev and G.A. Dzhinchvelashvili	764
Numerical Investigation of Stator Blades Bow Effect on the Rotor Blade Erosion of a Wet Steam Turbine	
H. Yao, W.L. Han, S.M. Pan and Z.Q. Wang Numerical Study of Single-Mode Interface Shape on Rotary Motion Instability Y. Jian	769 774
Static Analysis of the Sub-Frame Based on Precision Load Z. Li, E.M. Wang and H.G. Li	779
Torque and Stress Characteristics of the Skewed-Roller Slipping Clutch Considering Frictional Contact and Dynamic Equilibrium M. Feng and Y. Li	784
The Movement Precision Analysis of Planar Four-Bar Mechanism with Joint Clearance W.W. Yang and R.J. Zhang	790
Dynamical Study of a Structure: The Case of Al Hoceima's Earthquake / Morocco A. el Ghoulbzouri, Z. el Alami, S. el Hannoudi and M.S. el Youbi	794
Research on Time-Domain Dynamic Response of Tension Leg Platform in Regular Wave W.M. Liu	801
Determination of Settling Velocity of Suspended Sediment in Estuary H.M. Huang, D.K. Chen, W.N. Zhang and C. Chen	805
Analysis on the Selection of Tooth Number for Closed Differential Planetary Gear Transmission Mechanism and Software Development J.F. Sun, H.F. Zhu, J. Wang and Q. Wang	809
Optimization Design of Rapid-Cooling Mixer of By-Pass System of Cement Production Based on CFD	014
Y. Mao, W. Fu and Z.B. Chen Research on the Chassis of Aircraft Recovery Trailer Based on ANSYS	814
Z.H. Xu, Q.C. Du and Z.Y. Hong Numerical Study on the Ballistic Impact on Lightweight Composite Armour J.R. Lu, X.L. Sun, X.H. Cai, S.Q. Dong and G.L. Wang	819 824
Structure Design of Manipulator for Pot Seedling Transplanter and Simulation Analysis J.F. Sun, X.Y. Li, W.J. Li, Y.Z. Zhu, J. Wang and Q. Wang	829
Study on Flexible Spin-Up Maneuver with Variable Cross-Section Based on Positional FEM L.Z. Ma, Y.Q. Yan, X.L. Diao and J. Liu	834
Numerical Investigation on Resistance Reducing Effect by Mass Injection through Porous Wall	020
Y. Zhao and T.L. Wang A Dynamic Simulation Design of a Ladder Fire Truck Based on ADAMS Q.F. Cui	838 843
Redesign of a Reverse Shoulder Prosthesis: Kinematic and Mechanical Study D. Tumino, T. Ingrassia, V. Nigrelli and G.B. Trinca	845
Strength Analysis of Epoxy Molding Compound Module Using Automated FEA System J.S. Lee, H.R. Hong, G.H. Jo and D.K. Park	852

Analysis of Sealing Properties of Coupled Gas Film Flow Field and Cantilever-Type Foil Deformation	
G. Ma and Y.L. Du	856
Effect of Surface Topography on Average Film Thickness between the End Faces for Mechanical Seal	860
L. Wei, P.G. Zhang and G.F. Fang Numerical Analysis of Serving Air Floating Needle Ban Based on Slit Type Cuide Bail	800
Numerical Analysis of Sewing Air Floating Needle Bar Based on Slit Type Guide Rail T.J. Zi, J.A. Zhang, Z.W. Lu and B. Liu	866
The Performance Analysis and Parallel Optimization of the OpenFOAM-Based Viscoelastic Solver for Heterogeneous HPC Platforms S. Zou, Y.F. Lin, J. Chen, Q. Wang and Y. Cao	873
A Novel RBF Tuning Strategy for Global Surrogate Modeling W.R. Duan and L. Tian	881
Optimal Design of a Hydraulic Suspension Mechanism of Aircraft Recovery Vehicle Z.Y. Hong, P.F. Zhang and Z.H. Xu	886
Comparison of Static and Dynamic Analysis on KJYF96/8 Mobile Refuge Chamber A.N. Zhang and Y.M. Gu	892
The Impact of Assembly on the Results of Modal Analysis Z.C. Zheng, X. Dong, Y. Gao, Z.T. Jiang and H.Y. Xiao	896
A New ESO-Based Method to Find the Optimal Topology of Structures Subject to Multiple Load Conditions	
D. Tumino, T. Ingrassia and V. Nigrelli	902
Study on the Ground Settlement Regularity Caused by Deep Caving Method S.X. Wei, Y.Y. Wang, C.Y. Jin, L.B. Dong and D. Liu	907
Chapter 9: Industrial Equipment and Technology	
Analysis for the Large Precise Equipment Assembly W. Jiang, Y.L. Han, W. Dong and Q. Zhou	915
Application of Water-Lubricated Bearings in Motorized Centrifugal Air Compressor for Fuel Cell Automotives M. Feng and T.M. Ren	920
Design Analysis of Dock Apron Skidway Blocks Q.G. Liu, L.Q. Jiang, L.Z. Li and G.X. Song	924
Design of Sealing Structure and Analysis of the Flow Field in Micro Internal Combustion	/
Swing Engine M. Sun, Z.Y. Zhang and W.J. Kong	930
Micro-Scale Manufacture of 3D Printing Y.P. Chen and M.D. Yang	936
Research on the Application of Adjustable Disc Type Nozzle Valve on Wellhead J. Zhang, Z.L. Ma, J.Q. Li, Y.G. Li and P. Zhang	942
The Design of Children's Multi-Function Carts Based on the Man-Machine Research M. Mao and L.L. Liu	946
ANN Based Rare Earth Lifting Permanent Magnetic Chuck Design N. Ding, D.T. Zhang and Z.Z. Wang	950
Design and Manufacture of Composite CNG Cylinders L.S. Gao	955
Green Ecological Design Research of Tourism Product Packaging F.F. Zhou, J.J. Liao and J. Teng	960
Comparative Exploration of Mini Vertical Axis Breeze-Driven Generator S.H. Bai and H.D. Yang	964
Development and Design of Cold Radiation Refrigeration Energy Saving Technology of Comfort Air Conditioning M.R. Li	968
New Method of Increasing Working Volume of a Certain Type of Hydraulic Accumulator G.B. Ding, Z.Q. Shi, H. Cui and Y.S. Huang	972
A Reflective Display Technology Based on Electrofluidics M.Z. Duan, R.A. Hayes, X. Zhang and G.F. Zhou	976

CFD Study on the Factors Influencing the Performance of PV-Integrated Double-Skin Facade Channel L. Chen, Q.Y. Shou and X.M. Pei	982
Lightweight of Aluminum Alloy Bumper Based on High-Speed Crash Component Test X. Wu and Z.Y. Chen	987
The Research and Application of Vertical Wells Multilayer Fracturing Technology L.W. Zhang, L.H. Fan and Y.L. Chang	997
Thermal Control Design for the Combination of Star Sensor Using C-C Graphite Material Z.M. Xu, M. Li and X.Y. Chang	1003
Experiment Analysis about Mechanical Properties of Rubber Bushing for Suspension Telescopic Shock Absorber L.P. Li	1008
Breakdown Process of Pseudospark Discharge Using the Various Discharge Module X.W. Gu	1012
Effects of Groundwater Heat Pump Systems on the Temperature and Quality of Groundwater in Recharged Aquifer	
B.H. Li, X.J. Cao, L.C. Liu, F.D. Zheng and N. Zhang	1016
Study on Size Selections of the Ten-Needle Inline Nozzle Structure X.Y. Li, H.J. Yuan and L.L. Zhang	1023
Chapter 10: Mechanical Structural Strength, Reliability and Risk Analysis and Assessment	
Frequency Reliability Sensitivity Analysis for Rotor System with Random Parameters L. Meng, S. Li, H. Li and L.J. Guo	1029
Global Performance Estimation Based on Gaussian Mixture Model for Wind Turbines W. Wang, M.H. Zhang, S.Q. Guo, H. Li, W. Lv, J.R. Yang and Z.C. Liu	1033
Study on Ball Screw Accuracy Reliability under Radial Force L.L. Huang, K.S. Wang and C.L. Zha	1037
A New Approach for Determining Joint Stiffness of Bolted Joints X.W. Wang, X.Y. Li, L.L. Zhang and X.G. Wang	1041
The Critical Equipment Selection Used Criticality Analysis in Factory Y.C. Xia	1045
Relationship Study between Bolt Shape and Anchor Performance S. Ren, J.X. Wu and J.Z. Li	1050
Study on Pretension Loss of Cables Applied in Mine J.X. Wu, S. Ren, Z.Y. Wang and J.Z. Li	1055
A Continuum Damage Mechanics Approach for Fatigue Life Prediction of Open-Hole Metallic Plate X.M. Chen, Q. Sun, D. Guan and F.P. Yang	1060
Application of EWK and Modified X-W Fracture Models to Load-Bearing Lug Joints C. Liu, Q. Sun and Y.J. Liu	1068
Rehabilitation of Cracked RC-Brick Masonry Wall with Opening by BFRP Composite Material Z. Lei, J.T. Qu and Y. Wang	1073
Numerical Simulation Analysis of Tailings Dam Heightening Expansion Stability H. Bing	1073
Creep-Fatigue Life Prediction for Aeroengine's High Temperature Component Y.R. Xia, J.T. Dai and Z.Y. Sun	1083
The Finite Element Research of Fatigue Properties of Steel Q345 Butt Welded Joint W.P. Ouyang, L.S. Chen and X.D. Xu	1087

Chapter 11: Vibration, Sound, Noise Analysis and Control

i

Optimization of Sound Package for Automotive Dash Panel A.M. Du, N. Wei and J.W. Shao	1098
Automotive Floor Sound Package Design Using Statistical Energy Analysis J.Y. Ding and J.W. Shao	1102
Composite Damping Circular Saw Blade Vibration Characteristics Analysis M.S. Zhang, P.X. Zhu and L.B. Cheng	1106
Coupling Vibration Research of a Turbine Blade-Disc System with Symmetric-Acyclic Structure	
Y. Zhang, P. Zhou, Q. Zhang and Y.H. Xie	1112
Finite Element Analysis of Wind Vibration Control Effect for Single Transmission Tower W.P. Xie, D.Z. Xia and W.J. Yang	1116
Simulation on Vibration Characteristics of Throat and its Timbre T.W. Pu	1121
Study of Wind Induced Vibration of Transmission Power Tower-Line System W.J. Yang and L.T. Liang	1125
Vibration Characteristics of Violin Bow String and its Timbre Effect G.M. Zhao	1130
Seismic Analysis for Axial Fan Used in Nuclear Power Plant W.B. Xu, W.Y. Xiang, Y.H. Lv and G.Y. Lu	1134
Study on Mechanical State Diagnosis of Power Transformer Winding Based on Vibration	
Method B. Zhang, J.B. Chen, H. Li and J.Y. Xu	1140
Analysis of a Seismic Performance on K8 Triangular Cone Partial Double Layer Spherical	
Reticulated Shell X.Y. Lu, R. An, Y.R. Chen, S.Y. Chen, J. Xin and F.C. Liu	1145

Chapter 12: Measurement Technology, Instruments and Sensors, Monitoring, Detection Technologies and Methodologies

A Flextensional Transducer Prototype with PVDF Piezoelectric Film J.J. Liu, L. Qin, L.K. Wang, C. Zhong, B. Zhang, C.X. Gu and D. Long	1153
A Low Noise Power Design for Electrical Impedance Tomography System Y.Y. Guo, X.Y. Chen and Y.Z. Yang	1159
A Sensitive Formaldehyde Sensor Based on Cataluminescence Coupled with Thermal Desorption H.W. Yang, Z. Xing and K.W. Zhou	1163
Inverse Identification of Nonlinear Boundary for a Pile Using Time Domain Multi-Point Approximations Method	
Y.G. Sun, G. Sun and Y.J. Gao	1167
Method on Fault Detection and Diagnosis for Track Circuit Based on Main Rail Voltage D.Z. Wu, Y. Fang and Q.S. Ma	1172
Power System Fault Diagnosis Method Summary Y. Zhao, W. Xiong, H.Q. Li and S.Y. Yang	1179
Random Sampling Approaches for Implementation of FPGA in Signal Processing D.X. Li	1184
Research on Measuring Methods on Explosion Seismic Waves H. Chen, D.R. Kong, X. Tong, F. Yang and L.P. Li	1188
Study on Volumetric Tool Wear Measurement Using Image Processing J.C. Liu and G.X. Xiong	1194
Underdetermined Blind Separation for Bearings Faults Based on the Improved Morphological Filter	
Z. Jun, W. Xing, Y.L. Chi and P. Nan	1200
A PXI-Based Biomedical Electrical Impedance Tomography System X.Y. Chen, T. Yang and Y.Z. Yang	1205
Air Quality Condition Assessment Based on Point Check and Benchmark Y.C. Xia	1210

j

Design of Capacitance Probe Sensor in Deep Hole Diameter Measurement Y.Z. Ma, X. Sun and Y.Z. Zheng	1214
Embedded Smart Textile Detecting Equipment Base on Flexibility Sensors Y.C. Wu, Y. Xue and F. Hu	1218
Research on Cotton Row Detection Algorithm Based on Binocular Vision Z.X. Zhu, Y. He, Z.Q. Zhai, J.Y. Liu and E.R. Mao	1222
Study of On-Line Monitoring Device for SF ₆ Humidity H. Yang	1228
The Study on Broad Directivity Characteristic of Piston Transducer with Finite Baffle L. Qin, C.X. Gu, L.K. Wang, C. Zhong, J.J. Liu, B. Zhang and D. Long	1233
Development of On-Line Monitoring System for Large Rotating Machinery under Complex Circumstance	1000
P. Xu, J.G. Yi and L. Zhao Improving the SNR of SWD Data by Adjusting the Impact Energy of Drilling Tools Y.K. Wang, R.Z. Yang, N. Chen, T. Zhang and J.F. Liu	1238 1242
Uncertainty Analysis for Static Balance Measurement of Hollow Be Rotor X.W. Cheng and N. Shi	1242
An Effective Independence-Improved Modal Strain Energy Method for Optimal Sensor Placement of Bridge Structures	121)
J.Z. Zhan and L. Yu	1252
Development of a Wearable Biosensor System for Ubiquitous Healthcare Applications M. Dai, Q. Wang and W.Q. Wu	1256
The Measurement Technique of Blind Hole Based on Capacitive Probe Sensor Y.Z. Ma, X. Sun and C. Wang	1260
Accurate Measurement and Digital Modelling of Complex Surface Y.Q. Liu, H.X. Cheng, Y.Z. Wang, J.S. Wang and Y.P. Sun	1264
Research of Material On-Line Identification Based on Terahertz Spectrum Q.H. Zhang, X. Chen, S. Ke, L. Han and Z.L. Zhou	1269
New Monitoring System of the Refractory Lining Wear in the Blast Furnace Hearth A.N. Dmitriev, M.O. Zolotykh, Y.A. Chesnokov, K. Chen, O.Y. Ivanov and G.Y. Vitkina	1274
Roundness Error Evaluation Based on Differential Evolution Algorithm L. Jin, Y.P. Chen, H.Y. Lu, S.P. Li and Y. Chen	1285
Stiffness Detection of Silicon Arm Based on Micro-Loading Method X.S. Quan, X. Jin, Z.J. Zhang, Y. Yu and L. Ma	1290
The Study on Optimum Thickness of Thermocouple Used for Measuring the Grinding Temperatures of Brittle Materials	
F.Y. You and Q.L. Dai	1296
Single-User Cyclic Spectrum Detector Design in Cognitive Radio J. Guo, L. Tang and Y. Dong	1301
Analysis and Experimental Verification on Bias Drift of Silicon Microgyroscope W.F. Tang, A.P. Qiu, G.M. Xia and Y. Su	1305
Vibration Analysis of Silicon Microgyroscope Based on Simulink W.F. Tang, A.P. Qiu, G.M. Xia and Y. Su	1310

Chapter 13: Mechatronics, Industrial Robots, Automation and Control Technologies

A Kind of Small Quadcopter	
Q.Z. Wang and Z.J. Yang	1317
A Method of Nonlinear Modal Superposition for Weakly Nonlinear Autonomous Systems J.G. Wei and L.M. Zhao	1321
Binocular Vision Sensor (Kinect)-Based Pedestrian Following Mobile Robot H. Zhang, R.J. Yan, W.S. Zhou and L. Sheng	1326
Control Method for Vehicles on Base of Natural Energy Recovery V. Pshikhopov, M. Medvedev and A. Gaiduk	1330
Control System Research of Square Steel Tube Straightening Machine S.G. Wang, P.Y. Zhan and H.B. Xu	1337

342
346
350
358
362
366
370
378
385
389
393
897
403
106
410
16
121
126
120
130
134
141
3 3 3 3 3 3 4 4 4 4 4

J. Wang and F. Wang	1441
Simulation and Analysis of DDR3 Bus Based on Fly-By Topology with Cadence B.P. Wang, J.S. Du, X. Tian and X. Bi	1447
Some Questions about Equivalent Circuit Synthesis and Nonlinear Electrical Circuit mplementation with the Specified Properties in the Electronic Simulation Tasks <i>V.V. Pivnev and S.N. Basan</i>	1454
Study of Circuit Breaker Status Evaluating Model Based on Matter-Element Theory Y. Teng, Z.Y. An, J.B. Yu, J. Wang and Y.G. Zhang	1458

The Impact of NiCuZn Ferrite Material on the Inductive Wireless Charging D.Y. Li, D.F. Liang and Q. Zhao	1462
Effect of Annealing and Gate Insulator Material Changing on the Performances of IGZO- TFT	
J.F. Shi, L.L. Chen and X. Sun	1467
Chapter 15: Computer Applications and Mathematical Modeling, Intelligent Algorithms and Optimization	
A Unified Framework for the Evaluation of Complex Networks B. Jiao, X.L. Pang, R.H. Guo and J. Du	1473
Highly Reliable Software Reliability Assessment Based on Statistics of Extremes and Bootstrapping Method H.N. Tong and Q.Y. Li	1477
Performance Improvement in the Pattern Classification of Nominal Data Sets Applying Multiple Correspondence Analysis R.C. Thom de Souza, M.T. Arns Steiner and L. dos Santos Coelho	1482
Phase Image Segmentation and Filtering Algorithm Based on Direction of the Gradient Factor C. Zhang, Z.W. Li and Y.S. Shi	1488
Research on Automatic Recognition of Separable Words in Modern Chinese X.F. Li, B. Liu and X.D. Tian	1488
The Attacking Dispersion Optimization in Multi Launch Rocket System Base-On Improved Genetic Algorithm W. Wang, W.D. Chen, S.Q. Zhang, J.L. Li and Y.E. Xie	1499
Theory and Technology Research on the Software Health Management H.Q. Zhang, Q.Y. Li and H.C. You	1503
Research of Intrusion Detection System Object Oriented Modeling L.L. Li and J.P. Tang	1507
A Novel Influence Measure Algorithm for Social Networks S.S. Du and Y.C. Wu	1511
Particle Swarm Algorithm Based on Boundary Buffering-Natural Evolution and its Application in Constrained Optimization T.B. Wu, T.Y. Zhou, W. Li, G.F. Zhu and Y.L. Liu	1517
Scheduling Jobs on Batch Machines Based on Ant Colony Algorithms X.B. Huang	1522
Study of Wind Farm Power Output Predicting Model Based on Nonlinear Time Series Y. Teng, Z.Y. An, X. Yu, Z.H. Wang and Y.G. Zhang	1526
The Construction of Biorthogonal High Dimensional Wavelet Packets W.Q. Yang	1530
Design and Implementation of Network Leave Examination and Approval System Based on CRP Digital Campus Information Management Platform B.W. Huang and Y. Jiao	1536
Track Routing Optimization Model Based on Fuzzy Clustering Method P.C. Meng, W.S. Yin, Z.X. Jiang and Y.Z. Li	1540
Wind Power Prediction Based on Cloud Model and GMDH Two-Stage Optimization Approach Z.K. Wei, D.N. Liu, Y.J. Xu, J. Xing and Y.L. Du	1545
Research and Implementation of Practical CAPP Database A.S. Jiao, J.W. Xie, H.P. Yan and J.C. Shen	1550
A Model of Competitive Hybrid Granularity Manufacturing Resource and its Unify Cloud Service Modeling X. Liu and W. Tan	1556
Application Study on an Extended Design Pattern L.L. Li and J.P. Tang	1562
Study of Combined Forecast Model of Wind Power Output Based on GM-Weibull Wind Speed Distribution Y. Teng, Q. Hui, X. Yu, Z. Liu and Y.G. Zhang	1566

A Class of Hyperspace Systems and Distributional Chaos W. Wang and X.G. Zhu	1570
Chapter 16: Industrial Engineering, Production Management, Operations, Quality and Control	
Maintenance Management: Rationale of TPM as the Research Focus A. Hj. Bakri, A.R. Abdul Rahim and N. Mohd Yusof	1575
The Rule of Law and Acquisitions and Risk Prevention in the Process of Cross-Border Mergers W. Liu and L. Xu	1583
Common Statistic Technology Applied to the Product Quality Control X.Q. Wang, B. Liu and Y.G. Liu	1585
Integrated Approach for Flexible Mixed Model Assembly Lines Balancing and Model Sequencing Problem	
L. Nie, Y.W. Bai, J. Wu and C.T. Pang Complex Adaptive Systems Integrating the Decision Making Process in Industrial Companies: A Scientific Conceptual Model	1593
D. Wollmann and M.T. Arns Steiner The Difference of Physiological Indicators of Ground and Underground Subway Workers:	1601
A Preliminary Field Study Q.G. Ma, X.L. Zhou, L. Zhao, J. Bian and W.H. Dai	1608
Real Estate Abroad: How to Make the Right Choice N. Vatin and O. Gamayunova	1612
Comparison of Chinese and American Product Injury Features Y.Q. Feng, Y. Yin, X.R. Zhang and Z.L. Xie	1616
Research on Life Cycle Environmental Property of Biomass Biodegradable Packaging Material X.H. An, P. Liu, Q. Meng, C.G. Su and S. Zhao	1620
Statistical Analysis as an Instrument for Improving the Quality of Products from Cellular Concrete	
E.A. Pospelova, M.Y. Elistratkin and D.D. Netsvet Investigation of the Datamation of Manufacturing Industrial Chain in the Big Data Era	1624
H. Zhou, R.Q. Li and Y. Yu	1629
Partner Selection of Agricultural Product Supply Chain Based on Discrete Particle Swarm Optimization Algorithm A.L. Chen	1633
Applying Neuroscience to Tourism Management: A Primary Exploration of Neurotourism Q.G. Ma, L.F. Hu, G.X. Pei, P.Y. Ren and P. Ge	1637
Shaping the Image of the Enterprise in the E-Commerce Network's Times H. He	1641
The Study for Doubly Selective Channel Estimation Algorithm Based on Cluster Characteristics	1 ~ 4 ~
Y. Wang, L.Y. Zhang and R. Zhang	1645

Chapter 17: New Technologies in Engineering Education

The Research of Peer-Reviewed Mode and Evaluation Standards Based on Online Published Papers	
Z.X. Fu	1655
Research on Context-Ware Technology in Ubiquitous Learning J. Zhang, L.W. Zhang and G.Y. Wang	1659
Application of the Operation Regulation Mode in the HVAC Engineering Teaching M.R. Li	1663
Competence Portfolio for Students of Physics and Engineering Majors T.N. Gnitetskaya, E.V. Karnauhova, N. Kovalchuk and E.B. Ivanova	1667

Design of Digital Teaching Platform of the Internet of Things B.W. Huang and J.Y. Li	1671
Education Quality Measured by the Classification of School Performance Using Quality	
Labels A.R.T. Góes, M.T. Arns Steiner and P.J. Steiner Neto	1675