## **Table of Contents**

**Preface, Committee and Sponsors** 

## **Chapter 1: Materials Research and Application**

Aerospace Industry	
G. Civcisa and T. Leemet	3
Computational Study of Effect of Increasing Heat Flux on Convective Heat Transfer in Sub Channels of Carbon Dioxide Flow at Pressure above Critical Value D. Sharma and K.M. Pandey	8
Some Aspects of Reliability Measures of Polymer Composites Stressed by Climatic Environment	
D. Valis and A. Krzyzak	14
Control of a Chemical Exchange Process for the <sup>13</sup> C Isotope Enrichment V. Mureşan, M. Abrudean, I. Clitan, Z. Kovendi, M.L. Ungureşan and T. Coloşi	20
Modeling a Chemical Exchange Process for the <sup>13</sup> C Isotope Enrichment Z. Kovendi, V. Mureşan, M. Abrudean, I. Clitan, M.L. Ungureşan and T. Coloşi	27
Friction Analysis between Uhmwpe, Alumina - Magnesia Ceramic and Pva Hydrogel, Biomaterials for Prosthetic Devices	22
C. Stamate, C. Munteanu and M.C. Stamate	33
FEM Simulation of Laminated Lightweight Materials Processed through Single Point Incremental Forming C. Girjob, G. Racz, O. Bologa and C. Biris	38
Bend Testing on Components Manufactured by Rapid Prototyping Technology in	36
Combination with other Materials J. Lipina, V. Krys and J. Marek	44
Characterization of ZnO Films Based Sensors Prepared by Different Techniques S. Bhatia, N. Verma, A. Mahajan and R.K. Bedi	50
Preparation and Characterization of Nickel and Copper Oxide/Hydroxide Films on Stainless Steels Substrates for Use as Cathodes in Alkaline Water Electrolysis D.S.P.P. Cardoso, P.S.D. Brito and L.F.F.T.T.G. Rodrigues	55
Characterization of the Thin Films Structures in Subwavelength Regime as Biosensing Materials R. Steigmann, N. Iftimie and A. Savin	62
Molecular Dynamics Simulations of Thermal Conductivity of Germanene Nanoribbons (GeNR) with Armchair and Zigzag Chirality	
M.A. Balatero, G.J. Paylaga, N.T. Paylaga and R.V. Bantaculo	67
Tool Wear of Aluminum/Chromium/Tungsten-Based-Coated Cemented Carbide in Cutting Hardened Sintered Steel	
T. Wada and H. Hanyu	72
Chapter 2: Design, Modelling and Simulation	
Analysis of the Deformation Mode and Determination of the Energy Dissipated by the Resistance Structure of the Vehicles A. Soica and S. Tarulescu	79
The Vehicle's Frontal Impact Influence on Driver in out of Position	
O.V. Oăt and N. Dumitru  The Vertical Axis Wind Turbine Efficiency Evaluation by Using the CED Methods	84
The Vertical Axis Wind Turbine Efficiency Evaluation by Using the CFD Methods I. Mălăel, V. Dragan and G. Vizitiu	90
Analytical Algorithm for the Optimal Kinematic Design of the Wheel Suspension  Mechanisms  C. Alexandru	96

Preliminary Simulation of a 3D Turbine Stage with <i>In Situ</i> Combustion S. Danaila, D. Isvoranu and C. Leventiu	103
CFD Simulation Approach for Semisubmersible Response in Waves Based on Advanced Techniques	100
I.C. Scurtu  Analysis of Unitory Tonsions on the Butterfly Volye	108
Analysis of Unitary Tensions on the Butterfly Valve I. Florescu, D. Florescu and D. Nedelcu	114
Three Dimensional Numerical Simulation of Vortex Structures in Barak River S. Kiran, U. Kumar and A.K. Dey	120
Optimizing Design of Piezoelectric Trimorph, as Positioning Element and Energy Harvesting Device C. Necula, C.D. Comeagă and O. Donțu	125
Computational Analysis of Hydrogen-Fueled Scramjet Combustor Using Cavities in Tandem Flame Holder S. Roga and K.M. Pandey	130
Computational Study of Deflagration to Detonation Transition in Pulse Detonation Engine Using Shchelkin Spiral P. Debnath and K.M. Pandey	136
Assessment of Off-Line Diagnostic Oil Data with Using Selected Mathematical Tools D. Vališ and L. Žák	141
Implementation of Real-Time Concentration Process Control System Design Based on PID and Fuzzy Logic Controller M.A.G. Elbakri	147
Particle Swarm Optimization Based Empirical Correlation for Prediction of Hydrate Formation in Deep-Water Pipeline A. Abbasi and F.M. Hashim	154
Frictional Contact Stress Analysis of Spur Gear by Using Finite Element Method M. Farhan, S. Karuppanan and S.S. Patil	159
Time Varying Meshing Stiffness of Cracked Sun and Ring Gears of Planetary Gear Train A.A. Muhammad and G.L. Liu	164
Bifurcation of Rupture Path-Linear and Nonlinear Damping D. Ling and C. Ching	169
Vibration Suppression of Timoshenko Beam Using Optimal DTMD T.Z. Chen, F. Yang and J. Fu	174
A Gyroscopic Damper System – A Damping Control with New Performance B. Scheurich, M. Gentner, M. Frey and F. Gauterin	178
Simulation of Nonlinear Sloshing Behaviors under Dynamic Actions X.Y. Yu, A. To and G. Ho	183
Modeling and Dynamic Analysis of a Novel Hydro-Pneumatic Suspension System L. Yang, F. Yang and M.B. Xia	188
Characteristic Feature of Dynamic Motion for Servo Press Machine by Direct Modeling Analysis	
T. Yamazaki and A. Watanabe	192
Solution of Non-Fourier Temperature Field in a Hollow Sphere under Harmonic Boundary Condition  A. Bahrami, S. Hosseinzadeh, R. Ghasemiasl and M. Radmanesh	197
	177
Chapter 3: Manufacturing Systems and Tools	
Using Hydro-Pneumatic Accumulators to Increase the Operation Safety of Heavy Duty Vertical Lathes	
D. Prodan, A. Bucuresteanu and E. Balan	207
Reverse Engineering Tehnique Applied for Manufacturing Thin Wall Plastic Parts A. Pop, A. Adam and A. Pop	212
HSC Linear Motor Machine Dynamic Stiffness Z. Pandilov and V. Dukovski	218
Example of Tool with Two Numerical Controlled Axes  T. Mikolajczyk, A. Borboni, D. Mackowski and M. Matuszewski	224

Researches Regarding the Use of Fuzzy Controllers within CNC Feed Drives R.E. Breaz and O. Bologa	229
Chips Shape in Case of Cutting Gears Using Flying Hobbing Cutter S.M. Croitoru and C. Mohora	235
Determination of the Cutting Moments at Teeth Tip in the Case of the Milling Cutter with Multiple Teeth E.L. Olteanu and C.F. Bîu	240
Multi-Response Optimization of Wire-EDM Process Parameters of Titanium Alloy Using Taguchi Method and Grey Relational Analysis  A. Ramamurthy, R. Sivaramakrishnan, S. Venugopal and T. Muthuramalingam	245
Direct Cladding from Molten Metals of Aluminum and Magnesium Alloys Using a Tandem Horizontal Twin Roll Caster	
H. Harada, S.I. Nishida, M. Suzuki, H. Watari and T. Haga  Compression Molding Cure Cycle Modelling and Optimization for Large Polymeric  Composite Parts Processing	250
I.V. Tarasov, S. Shevtsov, I.V. Zhilyaev and E.E. Orozaliev	257
Production of Metal Matrix Composite Using a Bottom Tapping Stir Casting Furnace R. Arunachalam, M. Al-Maharbi, Y. Al Kiyumi, E. Aal-Thani and M. Al Mafraji	263
Artificial Neural Network Model for Tool Condition Monitoring in Stone Drilling D. Brezak, T. Staroveski, I. Stiperski, M. Klaić and D. Majetic	268
Study on the Influence of Workrest Positions on the Deflection of Crankshaft of an Orbital Grinding System	274
J. Jang, W.C. Choi, C.R. Cho and S.J. Cho  Evaluation of Surface Finish of Electrical Discharge Machined AISI 304 Stainless Steel with	274
Various Pulse Generators T. Muthuramalingam, B. Mohan and D. Saravanakumar	279
Quantitative Evaluation of Voids in Lead Free Solder Joints S. Mallik, J. Njoku and G. Takyi	284
Chapter 4: Sensors and Mechanical Engineering	
Adaptable High-Tech Mechatronic Equipment with Laser Scanning for Multicontrol 3D of Complex Components from Automotive Industry A.C. Voicu and G.I. Gheorghe	293
Research on Tactile Sensors Interface - Review of Theoretical and Practical Approach V.C. Anghel and I.G. Gheorghe	299
Adaptronic Engineering Used in the Construction of Intelligent Mechatronic Equipment and Systems for the Automotive Industry G.I. Gheorghe, I. Ilie and V. Gornoavă	305
Non Contact Displacement Transducers Implementation as Stage in the Development of a Flexible Low Cost Coordinate Measuring Machine	
B.C. Braun  Connecting System for Quick Replacement of Mechatronic SCHUNK Power Cube Modules	312
for Mobile Robotic Systems Z. Bobovský, V. Krys, J. Babjak and T. Kot	318
	324
Proportional Hydraulic Directional Control Valve with Planar Distribution and Differential Control  M. Avram, D. Duminică and T.C. Apostolescu	324
Control M. Avram, D. Duminică and T.C. Apostolescu Using Inertial Sensor System to Measure the Workspace of the Surgeon's Upper Limbs	
Control M. Avram, D. Duminică and T.C. Apostolescu Using Inertial Sensor System to Measure the Workspace of the Surgeon's Upper Limbs during Operations A. Soroush and F. Farahmand	329
Control M. Avram, D. Duminică and T.C. Apostolescu Using Inertial Sensor System to Measure the Workspace of the Surgeon's Upper Limbs during Operations A. Soroush and F. Farahmand Hydraulic Control of Speed and Position of a Pneumatic Actuator M. Avram, C. Bucşan, D. Duminică, D. Rizescu and D. Besnea	329 334
Control M. Avram, D. Duminică and T.C. Apostolescu Using Inertial Sensor System to Measure the Workspace of the Surgeon's Upper Limbs during Operations A. Soroush and F. Farahmand Hydraulic Control of Speed and Position of a Pneumatic Actuator	

A Modality to Optimize Common Functioning of a Pressure Wave Supercharger with an Internal Combustion Engine	
C.I. Leahu, A. Chiru and S. Tarulescu	350
Generating Guided Waves for Detection of Transverse Type-Defects in Rails S. Teidj, A. Khamlichi and A. Driouach	355
Imaging Subsurface Water Pipe Using GPR and Evanescent Waves: Experimental and Simulations Data	
N. Iftimie, G.S. Dobrescu and A. Savin	359
Novel Strategy for BLDC Motor Rotor Position Detection L.Z. Cao and S.H. Yang	365
Experimental Investigation on Dynamic Characteristics of Magneto-Rheological Fluid Suspension through on Road Comfort Testing K.G. Saravanan and N. Mohanasundara Raju	373
Chapter 5: Aerospace Engineering Research	
Simulation of 5DOF Model for Arial Grasping H.R. Fathabadi, A. Banazadeh and F. Saghafi	381
Mathematical Model and Performance Evaluation for a Small Orbital Launcher T.V. Chelaru and A. Chelaru	388
Study of Air Excess in Relation with Engine Parameters for a Generalized Reaction Based on JET-A Fuel R. Catana and G. Cican	395
Multibody Modeling and Simulation of Monocopter Micro Air Vehicle M.E. Dormiyani, A. Banazadeh and F. Saghafi	401
A Linear Quadratic Integral Design Approach for the Automatic Control System of a Launch Vehicle A.M. Stoica, C.E. Constantinescu and S. Nechita	410
Application of $\mathbf{L}_1$ Adaptive Control to a High Maneuverability Aircraft C. Ene and A.M. Stoica	418
The Limits of Downsizing - A Critical Analysis of the Limits of the Agile Flying Wing MiniUAV	
V. Prisacariu, C. Boşcoianu, I. Cîrciu and M. Boşcoianu  Design and Kinematic Analysis of Gull Inspired Flapping Wing Model  T. Goyal, D. Kumar, V.S. Kumar, P.M. Mohite and S. Kamle	424
Modal Analysis of Hummingbird Inspired MAV Flapping Wings D. Kumar, V.S. Kumar, T. Goyal, P.M. Mohite and S. Kamle	435
Flow Control Using Air-Jet to Improve the Aerodynamic Performance of a Multi-Element Airfoil	441
H. Akbar, Y.Q. Jiao and A. Bakar Lubrication for Moving Mechanical Systems Used in Spacecraft	441
S. Krishnan	446
Chapter 6: Robotics	
Proper Smart Method of the Inverse Kinematic Problem A. Olaru, S. Olaru and N. Mihai	455
Aspects of a Safety Operation of Service Robots on Glass Walls M. Horák, F. Novotný, M. Starý and J. Černohorský	461
Control System of the Mobile Robot TELERESCUER P. Novák, J. Babjak, T. Kot and W. Moczulski	466
An Improvement of the Rapidly-Exploring Random Tree Method for Path Planning of a Car-Like Robot in Virtual Environment T. Gîrbacia and G. Mogan	471
3D Printed Biped Walking Robot	7/1
T. Mikolajczyk, A. Borboni, X.W. Kong, T. Malinowski and A. Olaru	477

Optimal Location of Robot Base with Respect to the Application Positions by Using Proper Neural-Network Method	
L. Ciupitu and A. Olaru	482
A Fuzzy Logic to Solve the Robotic Inverse Kinematic Problem F. Aggogeri, A. Borboni, R. Adamini and R. Faglia	488
Localization and Path Planning for an Autonomous Mobile Robot Equipped with Sonar Sensor	
C.M. Pop, G.L. Mogan and M. Neagu	494
<b>Testing the Accuracy of the Trajectory Ride for Omnidirectional Mobile Robot Odin</b> M. Gala, V. Krys and T. Kot	500
Sensory Subsystem of a Stair-Climbing Mobile Robot T. Kot, J. Marek, V. Mostýn and P. Novák	506
Analyses about Trackability of Hand-Eye-Vergence Visual Servoing in Lateral Direction Y. Cui, K. Nishimura, Y. Sunami, M. Minami, T. Matsuno and A. Yanou	512
Chapter 7: Power and Energy Engineering	
Performance of Hydrogen Technology for Power Supply of Passive House R.A. Felseghi, T.M. Şoimoşan, C. Safirescu, E. Moldovan, I. Aşchilean and G. Iacob	521
Experimental Research on Magnetic Treatment of Fuel Fluids before Burner for Increasing Thermal Efficiency and Reducing Emissions Resulting from the Burning Process R. Ciobanu, M. Repetto, O. Donţu, D. Besnea and A. Spanu	526
Influence of the Operating Regime on the Performances of Thermal Solar Systems Integrated in Heating Networks T.M. oimoan, R.A. Felseghi, C.O. Safirescu and G.D. Iacob	531
Hybrid Solar-Wind Stand-Alone Energy System: A Case Study G. Corsiuc, C. Mârza, E. Ceuca, R.A. Felseghi and T. Şoimoşan	536
Data Acquisition and Processing Method Adequate for High Speed Transient Electrical Events	
A. Purcaru, D.M. Purcaru and I.M. Gordan	541
Aerial Infrared Thermography: A Scalable Procedure for Photovoltaics Inspections Based on Efficiency and Flexibility C. Cioaca, S. Pop, E.C. Boscoianu and M. Boşcoianu	546
Numerical Study on Impeller Performance of Mini Hydro Turbine	310
K.H. Kim and J. Cahyono	552
Design of a Gorlov Turbine for Marine Current Energy Extraction N. Chettiar, S. Narayan, J.N. Goundar and A. Deo	556
Design of a Ducted Cross Flow Turbine for Fiji	
J.N. Goundar, N. Chettiar, S. Narayan, A. Deo and D. Prasad	561
Chapter 8: Bioengineering Research	
Intravascular Stent Motor U. Nishizawa and S. Toyama	569
New Assistive Device for People with Motor Disabilities I.D. Geonea, M. Ceccarelli and C. Copilusi	574
Concerning on a Lower Limb Joint Affections Rehabilitation Equipment Command I.M. Petre, T. Deaconescu and A. Deaconescu	580
A Virtual Reality System for Pre-Planning of Robotic-Assisted Prostate Biopsy F. Gîrbacia, S. Butnariu, D. Voinea, B. Tzolea, T. Gîrbacia and D. Pîslă	585
Personalized Calibration of Heart Rate and SpO2 Using Smartphones as Driver Assistant A.I. Dumitru, G.L. Mogan and L. Jalbă	591
<b>Design of a Scoliosis Monitoring System Using Inertial Sensors</b> G.D. Voinea and S. Butnariu	597
Infrared Thermography – A Tool for Computer Assisted Research in Rehabilitation Medicine	
M.C. Cojocaru, I.M. Cojocaru, N.A. Cojan Carlea, D. Cinteza and M. Berteanu	603

Facial Paralysis - Thermal Patterns I.M. Cojocaru, M.C. Cojocaru, I. Ciobanu, M. Berteanu and C. Giurcaneanu	608
Design and Motion Analysis of a Powered Wheelchair I.D. Geonea, N. Dumitru and V. Dumitru	613
Preliminary Simulation of the Flow in the Root Canal Using New Irrigation Needle D. Isvoranu and S. Danaila	621
Experimental Identification of Heating Process from Hyperthermic Intraperitoneal Chemotherapy (HIPEC) Equipment I. Clitan, D. Moga, C. Lungoci, V. Muresan and N. Stroia	626
Software Development for Redesigning Bespoke Medical Products Obtained with Additive	
Manufacturing Technologies M.E. Ulmeanu, C.V. Doicin, D. Cazacu and C. Neagu	631