OPTIROB 2013

Selected, peer reviewed papers from the OPTIROB2013 International Conference on Biomechanics, Neurorehabilitation, Mechanical Engineering, Manufacturing Systems, Robotics and Aerospace: Optimization of the Engineering Systems

Applied Mechanics and Materials Volume 332

Mamaia, Constanta Romania 20-23 June 2013

Editor:

Adrian Olaru

ISBN: 978-1-62748-852-5

Printed from e-media with permission by:

Curran Associates, Inc. 57 Morehouse Lane Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2013) by Trans Tech Publications Ltd. All rights reserved.

Printed by Curran Associates, Inc. (2013)

For permission requests, please contact Trans Tech Publications Ltd. at the address below.

Trans Tech Publications Ltd. Laubisrutisr 24 CH-8712 Stafa-Zuerich Switzerland

Fax: +41 (44) 922 10 33 Fax: +1 (603) 632-5611 e-mail: sales@ttp.net

Additional copies of this publication are available from:

Curran Associates, Inc. 57 Morehouse Lane Red Hook, NY 12571 USA Phone: 845-758-0400 Fax: 845-758-2634 Email: curran@proceedings.com Web: www.proceedings.com

Table of Contents

Preface, Committee and Sponsors

Chapter 1: Aerospace Engineering and Hydro-, Aero-Dynamics Applications

Experimental Investigations and Numerical Simulations of the Viscous Flow around T- Profiles	
M. Schiaua, A. Dragomirescu and C.A. Safta	3
On a New Model Reduction Method for CFD Systems Used for Flow Control Design A.M. Stoica and M. Stoia-Djeska	9
Design Methodology and Preliminary Sizing of an Unmanned Mars Exploration Plane (UMEP)	
M. Behroo, A. Banazadeh and A.R. Golkhandan	15
Control of Vortical Flows Past Open Cavities M. Stoia-Djeska, C.A. Safta and A. Cotuna	21
Hydrodynamic Studies on Spherical Valve I. Florescu, D. Florescu and D. Nedelcu	27
Reentry Design Solution for a Hypersonic Small Capsule R.D. Rugescu	33
Morphing Wing Concept for Small UAV V. Prisacariu, M. Boscoianu and I. Circiu	44
Multi-Objective Genetic Algorithm for Hover Stabilization of an Insect-Like Flapping Wing H. Khodabakhsh and A. Banazadeh	50
Frequency Response Analysis for Dynamic Model Identification and Control of a Ducted Fan Aerial Vehicle in Hover	
M. Effati and A. Banazadeh	56
Aspects Regarding Software Simulation of a Quadcopter Dynamics C. Predoi, L. Coșereanu, C. Axente and D.I. Suteu	62
Chapter 2: Navigation Systems, Data Acquisition and Applications	

Robust Estimation for Optimal Guidance Laws A.M. Stoica	71
Enhanced Accuracy Navigation Solutions Realized through SINS/GPS Integrated Navigation System	
O. Fariz, M. Ushaq, L. Yan and F. Li	79
Robust Stability Analysis in the Presence of Time-Varying Uncertainties and Time Delay V. Pana and A.M. Stoica	86
Varistor Model Suitable for PSIM Circuit Simulations C. Mihalache, S. Nitu and F. Ionescu	92
Electromagnetic Field Exposure from GSM and UMTS Indoor Base Stations V. Nitu	98
A Fault Tolerant SINS/GPS/CNS Integrated Navigation Scheme Realized through Federated Kalman Filter M. Ushaq, F.J. Cheng and A. Jamshaid	104
Standalone Multi Antenna GNSS Code Based Attitude Determination of Nanosatellite: Design and Implementation	
L. Meibo, N.A. Naqvi and Y.J. Li PC104 Interface Decommonded for High Speed Date Acceptification Systems	111
PC104 Interface Recommended for High Speed Data Acquisition Systems D. Purcaru and A. Purcaru	119
Design and Implementation of FOG Based Gyrocompass A. Abbas	124

How to Synchronize and Register an Optical-Inertial Tracking System A. Soroush, M. Akbar and F. Farahmand	130
Chapter 3: Robotics and Automation Systems, Control	
Design, Implementation and Simulation of an Experimental Multi-Camera Imaging System for Terrestrial and Multi-Purpose Mobile Mapping Platforms: A Case Study K. Hammoudi and J. Mc Donald	139
Robot Control for Home Application C.I. Rizescu, M. Ciocan and D. Rizescu	145
Stereoscopic System with the Tight Tilted Cameras P. Novac, V. Mostýn, T. Kot and V. Krys	154
The Dynamic Behavior of the Prehension Mechanism of One Transfer Manipulator with Electro-Hydraulic Acting C. Cristescu, C. Dumitrescu, L. Dumitrescu and I. Ilie	165
Calculus and Implementation of a TRTR Industrial Robot Servicing a Flexible Manufacturing Cell Destined for the AAV Building Industry S.M. Petrişor and G. Bârsan	171
Unilateral Gripping Mechanism Effectors M. Hajduk, Ľ. Šidlovská and P. Tuleja	181
Static and Dynamic Stiffness of the Mechatronic Position Servo Systems Z. Pandilov and V. Dukovski	186
Design of the User Interface for a Robotic Spray Pyrolysis System to Deposit Thin Films M. Enescu and C. Alexandru	194
Determining the Shape and Volume of the Work Space for the Robot with Parallel Structure Delta 3DOF Using the Monte Carlo Method D. Andrioaia, G. Stan, M. Pascu and L. Mihăilă	200
Improvements on Positional Accuracy by Using Mechatronic Device A.R. Spanu, D. Besnea, O. Dontu and M. Avram	206
Optimal Robotic Assembly by Dynamic Markings I.A. Tabără and I. Dugăeșescu	212
NAO Robots Collaboration for Object Manipulation A.N. Panfir, R.G. Boboc and G. Mogan	218
Determining the Driving Torques of the Robots with Delta 3DOF Parallel Structure by Using the MSC ADAMS Software Pack D. Andrioaia, D. Rotar and G. Puiu	224
Software Modules for Command and Control of the Anthropomorphic Gripper for Robots I. Staretu, A. Itu and C.C. Moldovan	229
Fuzzy Multiobjective Optimization Used in Tolerance Synthesis of Mechanisms D. Duminică, I. Dutu, M. Avram and V. Gheorghe	235
Upon the Coherence of Optimization in Robotics M. Neacşa, G. Adîr and A. Adîr	241
Control System Design for a Mechatronic Solar Tracker M.A. Ionită and C. Alexandru	248
Particular Aspects on the Dynamics of Hydraulic Driven Robot with Spherical Joints A.S. Ghenadi, L. Topliceanu and L. Bibire	254
Extension Hybrid Force-Position Robot Control in Higher Dimensions V. Vladareanu, F. Smarandache and L. Vladareanu	260
Videooptical Surface Shape and Integrity Estimation in Robots Machining T. Mikolajczyk	270
Assisted Research of the Robots Kinematics and Dynamics Behavior with LabVIEW Instrumentation A. Olaru and S. Olaru	276

Chapter 4: Mechanical Systems Engineering and Materials Engineering

Dynamics of Adaptive-Mechanical CVT (Gear Variator) K.S. Ivanov, G. Ualiev and Z. Ualiev	289
Educational Model for the Kinematic Study of Non-Circular Gears L. Ciupitu	297
Considerations Regarding PWM Characteristics for Accurate Motor Control N. Mihai and N. Maximilian	305
Expert System for Coupling Selection E.V. Butila, A.N. Panfir and G. Mogan	314
Researches Regarding Modal Analysis of a Pressure Wave Supercharger Rotor C.G. Atanasiu and D.E. Buzea	319
On the Choice of Shape Functions of Unsymmetrical Elastic Rotors H. Parzer, H. Gattringer and S. Hubinger	325
Thermal Effect on Static Bending, Vibration and Buckling of Reddy Beam Based on Modified Couple Stress Theory	
A.R. Daneshmehr, M. Mohammad Abadi and A. Rajabpoor	331
Passivity Based Control of a Cart with Inverted Pendulum M. Jörgl, K. Schlacher and H. Gattringer	339
On Mechanical Amplification of the Piezoelectric Actuators Displacements A.L. Cartal, M. Avram, C. Bucşan, T.C. Apostolescu and V. Gheorghe	345
Multi-Criteria Kinematic Optimization of a Front Multi-Link Suspension Mechanism Using DOE Screening and Regression Model V. Totu and C. Alexandru	351
Vibration Behavior Analysis of Wire Rope Isolators Under Traction and Compression Load D. Buzea, A. Iacob, C. Soimaru and L. Ungureanu	357
Effect of Processing Techniques Used for Improvement of Mechanical Properties of Glass Fiber Epoxy Nano Composites	
A. Sarim, B.M. Zhang and C.C. Wang	363
Study Concerning the Maximal Depth of a Rectangular Part Made from Tailor Welded Blanks A. Albut	369
Considerations on Steel Behavior at Oligocyclic Fatigue	309
L. Bibire, G.A. Stelian and T.L. Stelian	375
Dynamic Response for a Functionally Graded Rectangular Plate Subjected to Thermal Shock Based on LS Theory	• • •
S.M. Nowruzpour Mehrian, M.H. Naei and S.Z. Mehrian	381
About the Mechanical Characteristics Determination for Desmopan Membrane by Digital Image Correlation Method	
L. Suciu, A. Botean, M. Suciu and V. Ros	396

Chapter 5: Manufacturing Systems

Probe-Radius Compensation of the Bevel Gears Tooth Surface Using 3D Measured Points E. Faluvegi and L. Cristea	405
Mathematical Model for the Calculation of Linear Speed for a Water Jet Cutting Machine S. Ferent-Pipas, B. Padurean and C. Ciupan	411
Modeling and Simulation of Closed-Loop Counterbalancing Hydraulic Units for Heavy- Duty Machine-Tools D. Prodan, E. Balan, A. Bucuresteanu and A. Motomancea	417
Automatic Manipulation of Parts Made from Yielding Material J. Slamka, M. Jedinák, M. Tolnay, M. Bachratý and O. Staš	423
Optimisation of Single Edge Tools Exploitation Process T. Mikolajczyk and L. Romanowski	431
Raw Material Stock Analysis in a Supply Chain E. Campean, L. Morar, L. Blaga, S. Pap and C. Gelmereanu	437
Improving the Accuracy of Parts Manufactured by Single Point Incremental Forming C. Radu, I. Cristea, E. Herghelegiu and S. Tabacu	443
Dimensional Compensation in Stern Tube Bushes Machining G.R. Frumusanu and A. Epureanu	449

Contribution to Mathematical Modelling of Oil Field Data D. Valis, L. Zak, J. Glos and A. Walek	455
Chapter 6: Biomechatronics and Neurorehabilitation, Medical Engineering Applications	
Research on the Influence of Progressive Plantar Supporters on the Stability in Biped Position	
B.C. Braun, I.C. Rosca and M.I. Baritz	465
Adaptronics - an Intelligent Science Adaptive to Advanced Systemes/Micro-Nanosystems G.I. Gheorghe, V. Bratu and O. Dontu	471
Evaluate the Electromagnetic Radiation Effects on the Facial Tissue L. Ungureanu, L. Cristea, M.I. Baritz, D. Cazangiu and D. Buzea	485
Design and Simulation of a Single DOF Human-Like Leg Mechanism I.D. Geonea, C. Alexandru, A. Margine and A. Ungureanu	491
Virtual Effort: An Advanced User Interface that Combines Various Visual Information with a Kinetic System for Virtual Object Manipulations C.C. Moldovan and I. Staretu	497
Methodology for the Identification of Needles Trajectories in Robotic Brachytherapy Procedure Using VR Technology S. Butnariu and F. Girbacia	503
Correlations in Basketball Free Throw A. Covaci and D. Talaba	509
Study on a Gripping Biomechanism Represented by the Human Dento-Maxillary Apparatus M. Ciortan, L. Luca and A. Stancioiu	515
Tribological Analysis and Optimization of Polymer Prosthetic Components as Drug Delivery Systems	515
M. Stamate Cretan and C. Stamate	521
Mathematical Analysis of Microwave Tomography: The Reconstruction Problem of Malignant Tumor M.H. Khalil, L. Jie and J.D. Xu	527
Analysis of Stability Asymmetries and of Gait Cycle Used to Determine the Recovery Degree for Subjects with Traumatic Locomotion Disorder M.I. Baritz, D.L. Cotoros, L. Cristea and B.C. Braun	534
Coil Type Ultrasonic Motor for Vascular Endoscope S. Toyama	540
Dynamic Analysis of a Micro-Cantilever Subjected to Harmonic Base Excitation via RVIM A.R. Daneshmehr, M. Akbarzadeh Khorshidi and D. Soltani	545
A IR Methods to Evaluate Surface Texture A.O. Trufasu	551

Keyword Index

Author Index