

Table of Contents

Preface & Committees

Chapter 1: Design, Modeling and Research of Mechanical and Mechatronic Systems

Use of Linguistic Fuzzy-Logic Control for Mechatronic System Modelling and Control R. Farana, B. Walek, M. Janošek and J. Žáček	3
Shape Memory Alloy Actuator (SMA) O. Ostertag and E. Ostertagová	9
Analysis of the Subsonic and Supersonic Flow Using Analytical and Numerical Methods M. Čarnogurská, T. Brestovič, M. Příhoda, M. Lázár and N. Jasminská	16
Influence Gearing Parameters on the Tooth Deformation of Spur Gears S. Medvecká-Beňová, P. Frankovský and R. Grega	27
Kinematic and Dynamic Analysis of Planar Mechanisms by Means of the Cosmos Motion Program J. Vavro, J. Vavro, P. Kováčiková and R. Bezdedová	31
Recognition of Seat Elements during Production through Image Processing P. Tarkowski, I. Malujda, K. Talaška, J. Górecki, M. Kukla and D. Wilczyński	35
Modeling and Simulation of Vertical Position Stability of Quadrocopter I. Virgala, A. Gmitterko and M. Kelemen	43
The Measures for Reducing of Truck Bodybuilding Vibrations R. Grega, J. Homišin, M. Moravič, P. Baran and S. Medvecká-Beňová	49
Contact Problems between the Hub and the Shaft with a Four-Angular Shape of Cross-Section for Different Angular Positions M. Dudziak, G. Domek, A. Kołodziej and K. Talaška	54
Methodology for Tuning a Semi-Active Dynamic Vibration Absorber on a Passive Suspended Seat M. Orečný, Š. Segľa and R. Huňady	63
Synchronous Control of Parallel Axes Equipment P. Božek, A. Abramov, I. Abramov, Y. Nikitin and A. Romanov	69
Simulation of Temperature Fields in the Transport Container N. Jasminská, T. Brestovič, M. Lázár, M. Čarnogurská and J. Václav	76
Determination of Boundary Conditions and Optimisation of the Graphite Electrode Cooling Circuit M. Lázár, T. Brestovič, M. Čarnogurská and N. Jasminská	88
Analytical and Numerical Solution of Large Actuator Deformation O. Ostertag, E. Ostertagová and L. Novotný	96
Using of Air Natural Convection for Cooling of Casks with Spent Nuclear Fuel in Dry Storage System J. Bocko and P. Lengvarský	103
Kinematical Analysis of Valve Mechanism Using MSC Adams/View D. Hroncová, P. Sivák and I. Delyová	108
Technological System for Weight Measurements in a Logistic Warehouse P. Božek, A. Korshunov and P. Kollár	118
Reverse Validation in the Robots Control P. Božek, E. Pivarčiová and A. Korshunov	125
The Design of Ideal Positioning Servo System L. Miková, A. Gmitterko and M. Kelemen	132
Kinematics Analysis of the Crank Mechanism Conveyor Using MSC Adams D. Hroncová and P. Šarga	140
Complex Approach to the Proposal for Resistance Temperature Sensor for Media Temperature J. Vavro, J. Vavro, P. Kováčiková and R. Bezdedová	150

Control Algorithm for the Path Tracking of the Nonholonomic Mobile Robots Ľ. Miková, A. Gmitterko and J. Jezný	154
Positioning of Pneumatic Actuator Using Open-Loop System I. Virgala, M. Kelemen, E. Prada and T. Lipták	160
Analysis of Impact Force in Tensioning Mechanism in MSC.ADAMS with Consideration of Rigid and Flexible Bodies A. Šapietová, P. Novák, L. Gajdoš and M. Kowalski	165
Analysis of the MPC Using in the Control of a Mechatronic System with Flexible Elements B. Juhásová and M. Juhás	174
Finite Element Simulation of Bending of Steel Bar Including Plasticity L. Novotný	182
Geometric Indicators of Flexible Slice Lip K. Talaška, I. Malujda, D. Wilczyński, J. Górecki, P. Tarkowski and M. Kukla	188
Possible Causes of Initiation of Plastic Deformation in the Containers Used in Food Industry F. Trebuňa, F. Šimčák, J. Bocko and M. Pástor	195
Measurement and Simulation of Transient Phenomena in Metal Hydride Bed T. Brestovič, N. Jasminská, M. Čarnogurská and M. Lázár	204
Kinematic Analysis of the Crank Mechanism with Rotating Cylinder Using MSC Adams/View P. Frankovský and D. Hroncová	213
Use the Differential Filters in the Control System of Pneumatic Muscle L. Cedro	224
3D-Computer Modelling of Contact Interaction between Spherical Indenter and Elastic-Plastic Body A. Shimanovsky and M.H. Abdulkader	234
The Process of Gait Generation for Snake-Like Robot with Nonholonomic Constraints T. Lipták, A. Gmitterko, M. Kelemen, I. Virgala, F. Menda and I. Glodová	240
Embedded Systems via Using Microcontroller M. Kelemen, E. Prada, T. Kelemenova, Ľ. Miková, I. Virgala and T. Lipták	248
Analysis of Stresses and Deformations in Container with Flat Bottom I. Delyová, P. Sivák, D. Hroncová and L. Jakab	255
Design of Modifications for Constructional Elements of Manipulator Arm Aimed at Measuring of Operational Torque M. Pástor, F. Trebuňa, F. Šimčák, Ľ. Gabáni and L. Vargovčík	261
Design of Wheeled Robot for Rough Terrain Ľ. Miková, M. Kelemen and P. Nestorovič	270
Friction Force Identification for Machine Locomotion E. Prada, M. Kelemen, T. Kelemenova, Ľ. Miková, I. Virgala, P. Frankovský and M. Lörinc	276
Upgrade of the Drives Control for Omnidirectional Mobile Robot Odin V. Krys, M. Gala, T. Kot and V. Mostýn	282
The Design of Tracked Mobile Robot for Non-Urban Environment Ľ. Miková, M. Kelemen and T. Pipík	288
Mobile Chassis on a Modular Principle Z. Konečný, P. Široký, V. Krys and T. Kot	294
Design and Production of a Unit that Enables the User to Control a Vehicle through the Use of a Smartphone M. Gašparík and M. Černý	300
Anisotropic Friction Difference Principle of In-Pipe Machine T. Kelemenová, M. Kelemen, I. Virgala, Ľ. Miková, E. Prada, A. Gmitterko and T. Lipták	306
Automated Headstone Photo Engraving D. Perdukova, M. Batmend and P. Fedor	313
Stepper Motor Control by ATMEL AVR Microcontroller I. Virgala, M. Kelemen, T. Lipták and E. Prada	321
The Effect of Magnetic Field on Magnetorheological Composites - Artificial Neural Network Based Modelling and Experiments M. Kukla, P. Tarkowski, J. Górecki, I. Malujda and K. Talaška	327

Chapter 2: Development and Modification of Computational Methods and Algorithms

Building Elements of Bond Graphs D. Hroncová, A. Gmitterko, P. Frankovský and E. Dzurišová	339
The Usage of Bond Graphs Methodology for Mechanical Systems Designing D. Hroncová, A. Gmitterko, T. Lipták and F. Menda	349
Evaluating Methods of the Strength Analyzes Results Realize in PTC Creo/Simulation Z. Konečný	357
Application of Evolutionary Algorithm in Elasticity J. Bocko, M. Dorn and V. Nohajová	363
Basics of Model Creation in Simulation Program Extend M. Pekarčíková, P. Trebuňa, M. Kliment, R. Popovič and J. Markovič	369
Contribution to Structural Optimising Subjected to Cumulative Fatigue Damage M. Sága, P. Pecháč and L. Radziszewski	375
Appropriate Setting of Genetic Algorithm for Parameter Identification of Bodner-Partom Material Model J. Bocko, I. Glodová and V. Nohajová	383
Program Tools for Residual Stress Evaluation by Ring-Core Method F. Menda, P. Šarga, T. Lipták and F. Trebuňa	389

Chapter 3: Experimental Methods of Measurements and Analysis in Engineering Practice

The Influence of Sampling Frequency on the Results of Motion Analysis Performed by High-Speed Digital Image Correlation M. Hagara and R. Huňady	397
An Analysis of the Constructional Insufficiencies of Locking System Components Using the Salinger-Grydilov Method J. Ivanka and P. Navrátil	404
Comparison of Different Estimation Algorithms Used in the Experimental Determination of Modal Parameters R. Huňady, M. Hagara and P. Pavelka	412
Experimental Measurement of Stress Distribution M. Sapieta, V. Dekýš and M. Uhříčik	416
Experimental Identification of Failures of High-Pressure Pump Drive R. Grega, J. Homišin, S. Medvecká-Beňová and J. Krajňák	421
Experimental and Numerical Analysis of the Damage Causes of Rail Traction Vehicles P. Sívák and O. Ostertag	426
Balancing of Forces in Segments of Axial Bearing by Dynamometers F. Trebuňa, F. Šimčák, M. Pástor and P. Šarga	437
Proposal of Methodology for Verification of Stress Distribution in Bolted Joints by Optical Method F. Trebuňa, M. Pástor, P. Frankovský, J. Kostka and E. Gabáni	443
Multiestimation Scheme for Identification and Adaptive Control of Nonlinear Laboratory Model DTS200 P. Navrátil and J. Ivanka	451
Extracting Load Research of Taper Interference Fit Made of Glass and Ceramics Parts Using a Servo Press P. Lekomtsev, P. Božek, A. Romanov, A. Abramov, I. Abramov and Y. Nikitin	461
Vibrational Study of the Spinning Disc Using LDV Technique P. Šároši, T. Harčarik and R. Huňady	469
Stress Analysis Performed by Photoelasticity and Digital Image Correlation M. Pástor, M. Hagara and J. Kostka	474

The Experimental and Numerical Analysis of Stress as a Tool for Optimizing the Selected Structural Components of an Injection Device	
P. Sivák and O. Ostertag	482
Static Compression Tests of Concentrated Crystallized Carbon Dioxide	
J. Górecki, I. Malujda, K. Talaška, M. Kukla and P. Tarkowski	490
Application of the Simple Linear Regression Model in the Experiment	
E. Ostertagová, O. Ostertag and P. Sivák	496

Chapter 4: Industrial Engineering of Modern Production

Processing the Experimental Data from Simulation Model of the Production Operation	
D. Onofrejšová and J. Kováč	509
Production Segmentation Using Hierarchical Methods of Cluster Analysis	
J. Halčínová, I. Janeková and G. Ižaríková	514
Virtual Commissioning as a Part of Mechatronical System	
J. Markovič, R. Popovič, P. Trebuňa, M. Pekarčíková and M. Kliment	521
Specific Car Manufacturer Recalls	
J. Kováč, J. Kádárová and L. Kalafusová	526
Concept to Support the Flexibility of Manufacturing System through Reconfigurable Structure Based on Modular Design	
V. Rudy and A. Lešková	536
Product Life Cycle Costing	
J. Kádárová, J. Kobulnický and K. Teplicka	547
Use of Simulation in Optimization of the Production Process and their Car Doors Assembly	
M. Kliment, P. Trebuňa, M. Pekarčíková, R. Popovič and J. Markovič	555
Designing Simulation Model of the Production Operation for Further Decision Making	
D. Onofrejšová, J. Kováč and J. Janeková	562
The Use of SMED in Engineering Manufacturing	
J. Mihok, J. Kádárová, M. Demečko and M. Ružinský	568
Application of Modelling and Simulation in the Selection of Production Lines	
J. Janeková, J. Kováč and D. Onofrejšová	574