

Table of Contents

Preface

Chapter 1: Design, Modeling and Simulation of Mechanics, Dynamics and Mechatronic Industry Systems

Passive Suspension of a Working Machine Horizontal Platform M. Orečný and Š. Segla	3
Simulation Analysis of Pneumatic Rubber Bellows for Segment of Hyper-Redundant Robotic Mechanism E. Prada, I. Virgala, G. Granosik, A. Gmitterko and Š. Mrkva	10
An Active Control of the Thin-Walled Mechanical Systems P. Šolek and M. Maták	22
Application of Karray-Bouc Hysteretic Model for Cumulative Damage Calculation Using Energy Fatigue Curve M. Sága, M. Vaško, P. Kopas and L. Jakubovičová	32
Automatic Generation of Equations of Motion of Mechanical Systems D. Hroncová and J. Filas	40
Calculations of Phase Transformations in Welding Simulations L. Novotný and V. Ivančo	46
Bending Tests and Simulations of GLT Beams L. Melzerová, M. Šejnoha and P. Klapálek	54
Control of a Robotic Arm on the Principle of Separate Decision of an Inertial Navigation System P. Božek	60
Effective Methods of Parameters Refinement of Machinery in the Program MSC.ADAMS A. Sapietová, M. Sága, B. Hyben and M. Sapieta	67
Inverse Kinematic Model of Humanoid Robot Hand I. Virgala, A. Gmitterko, M. Kelemen, L. Miková and M. Varga	75
Kinematic Analysis of Mechanisms Using MSC Adams D. Hroncová, I. Delyová and P. Frankovský	83
Kinematic Analysis of Crank Rocker Mechanism Using MSC Adams/View I. Delyová, D. Hroncová, P. Frankovský, E. Dzurišová and F. Rákay	90
Kinematic Analysis Planar Mechanism of a Pump Using MSC Adams P. Šarga and D. Hroncová	98
Kinematic Model of Nonholonomic Mobile Robots J. Jezný	107
Methodology and Application of the Kruskal-Wallis Test E. Ostertagová, O. Ostertag and J. Kováč	115
Snake Robot Movement in the Pipe Using Concertina Locomotion I. Virgala, M. Dovica, M. Kelemen, E. Prada and Z. Bobovský	121
Mathematical Model of Four Wheeled Mobile Robot and its Experimental Verification L. Miková, M. Kelemen and D. Koniar	130
Modeling of Newtonian and Non-Newtonian Liquid Sloshing in Road Tanks while Braking A. Shimanovsky, M. Kuzniatsova and A. Sapietová	137
Modelling a Liquid Material in Drop Test Simulations of a Cask for Liquid Radioactive Waste V. Ivančo and M. Orečný	145
Numerical Modelling of Glued Joints between Metal and Fibre Composites Using Cohesive Elements V. Lašová and P. Bernardin	156
Numerical Simulation of the Impact on Wide Composite Sandwich Beam V. Laš, T. Mandys, T. Kroupa and R. Hynek	162

Parallelepiped Sandwich Shell - Searching for the Optimal Geometric Parameters E. Tertel, P. Kurylo and W. Papacz	170
Simulation Model of Manipulator for Model Based Design Ľ. Miková, M. Kelemen, I. Virgala and M. Michna	175
The Simulation Model of Experimental Equipment for the Research of Pipe Conveyor Belts Using ABAQUS Software G. Fedorko and V. Molnar	183
Numerical Analysis of the Influence of Material Model on Response of Compressed Imperfect Thin-Walled Channel V. Ivančo, G. Fedorko and L. Novotný	188
Deformation and Stiffness of Spur Gearing Solved by FEM M. Malák	194
Trajectories of Projectiles Launched at Different Elevation Angles and Modify Design Variable in MSC Adams/View D. Hroncová and M. Grieš	198
Drive Dynamic Analysis – The Key to Optimal Drive Performance I. Formánek and R. Farana	208
Hyperplastic Material Models and their Applications in Engineering I. Glodová and J. Bocko	216
Influence of Pipe Geometric Deviations on In-Pipe Machine Locomotion T. Kelemenová, F. Duchoň, M. Puškár, M. Kelemen, P. Kurylo, E. Prada and T. Lipták	221
Analytical and Numerical Proposal for Designing Plastic Vessels N. Jasminská, T. Brestovič and M. Puškár	227
Integrated System of Mixed Virtual Reality Based on Data Glove CyberGlove II and Robotic Arm MechaTE Robot J. Kováč, F. Ďurovský and J. Varga	239
Modal Analysis of Circular Plates J. Bocko, P. Šivák, I. Delyová and Š. Šelestáková	245
Numerical Analysis of Stress States for Graphitic Cast Iron Structures J. Vavro, J. Vavro, P. Kováčiková, P. Kopas, M. Handrik and R. Bezdedová	252
Puck Collecting Robot M. Kelemen, T. Salovka, T. Kelemenová, I. Virgala, Ľ. Miková, V. Maxim, F. Duchoň and P. Kurylo	256
Regression Model Design for the Prediction of Pipe Conveyor Belt Contact Forces on Idler Rollers by Experimental Tests V. Molnar, G. Fedorko and B. Stehlíková	265
Stress Analysis of the Thin-Walled Vessels I. Delyová, P. Šivák, D. Hroncová and J. Kováč	273
The Stress Analysis in Dangerous Section of Gear Teeth S. Medvecká-Beňová, M. Mantič and R. Grega	279
Identification and Control of Nonlinear Laboratory Model Amira DR 300 P. Navrátil	284
An Improved Heat Equation for Fully Coupled Thermal-Structural Finite Element Analysis Using Small Strain Formulation L. Écsi and P. Élesztős	294
Actuation of Control System for Racing Engine Using Active Data Maps R. Tonhajzer, M. Puškár, M. Kopas, E. Faltinova and P. Čopan	304
Geometric Optimization of the Differential Gearbox S. Medvecká-Beňová and P. Frankovský	311
Early-Stage Design of Robotic Manipulator Using Dual Visual Perception J. Šarloši, R. Surovec, O. Šimko, J. Jezný, L. Vargovčík and M. Varga	316
Design of Control of DC Motor Ľ. Miková, M. Kelemen, V. Maxim and J. Jezný	325
The Use of Nonlocal Theory for Bending Vibrations of Single-Walled Carbon Nanotubes J. Bocko and P. Lengvarský	332

Chapter 2: Analysis and Mathematical Methods, Industry and Manufacturing Applications, Applied Mechanics

Analysis and Evaluation of Differences Dimensional Products of Production System P. Božek and P. Pokorný	339
Analysis of the Fatigue Life of Composite Leaf Springs W. Papacz, E. Tertel, P. Frankovský and P. Kuryło	346
Composites and Reinforced Plastics in the Automotive Industry K. Bielefeldt, J. Walkowiak and W. Papacz	352
Methodology for Classification of Material Items by Analysis ABC/XYZ and the Creation of the Material Portfolio M. Pekarčíková, P. Trebuňa and M. Fiľo	358
Operational Safety of Compressor Station Pipeline P. Sivák, I. Delyová and F. Trebuňa	366
Optimization and Elimination of Bottlenecks in the Production Process of a Selected Company P. Trebuňa, M. Kliment and M. Fiľo	370
Optimization Methods in the Design of Electromechanical Actuators J. Wagner	376
Optimization of Device Selection in Design of Technological Lines for the Aggregates Production M. Laciak and M. Šofranko	387
Production Structure Reconfiguration Based on Cluster Analysis of Production Objects J. Halčinová, I. Janeková, V. Rudy and P. Trebuňa	395
Application of Differential Equations to Calculations of Large Deformations of Structural Members O. Ostertag, L. Novotný and E. Ostertagová	400
Photoelast Method and Possible Applications of Mathematical Statistics in Prediction of Stress State of Structural Elements O. Ostertag, E. Ostertagová and P. Frankovský	405
Influence of Severe Plastic Deformation on the Properties of a Selected Aluminium Alloy P. Lacková, M. Buršák, T. Kvačkaj and J. Tiža	412
Model of the Decision Support System under Condition of Non-Determination for Manufacturing Process Support C. Klimeš and R. Farana	416
Increase of Tool Steel Durability in Abrasion Wear Conditions M. Orečný, P. Frankovský, P. Lacková and M. Buršák	424
Influence of Material Structure and its Properties on Predicting Life of Pressure Pipelines I. Delyová, P. Sivák, F. Trebuňa and B. Hricová	430
Residual Stress Prediction Using Neural Network Approach F. Menda, M. More, G.P. Cardona-Cuervo and F.J. Martinez-Tabares	436

Chapter 3: Experimental Methods in Engineering

Application of Transmission Photoelasticimetry for Stress Concentration Analyses in Construction Supporting Parts M. Pástor and F. Trebuňa	443
Improved GNSS Localization with the Use of DOP Parameter F. Duchoň, J. Hanzel, A. Babinec, J. Rodina, P. Paszto and D. Gajdosik	450
Laboratory Experiment of New Cutting Materials in Milling Processes I. Vilček, J. Kováč and J. Janeková	467
Modal Analysis of the Manipulator Arm on the Mobile Chassis M. Hagara, F. Trebuňa and R. Huňady	472
Spectral Differentiation of Spectrometers and their Application in Mechatronic Systems J. Ivanka and M. Adámek	478

Strain and Stress Analysis around the Notches Using ESPI Method M. Kalina and F. Šimčák	484
The Analysis of Different Stochastic Patterns during Loading in Plastic Area Using DIC Method M. Schrötter, M. Hagara and M. Kalina	490
The Influence of Facet Size on the Accuracy of Modal Parameters Determined by Digital Image Correlation Technique R. Huňady, M. Hagara and F. Šimčák	496
A Comparison of Modern and Classical Experimental Methods of Mechanics in Strain Investigation M. Pástor and M. Hagara	501
An Investigation of the Temperature Influence on a Shift of Natural Frequencies Using Digital Image Correlation M. Hagara, M. Schrötter and P. Lengvarský	506
Uncertainty of Dust Mass Concentration Measurement M. Dovica, V. Maxim, M. Kelemen, T. Kelemenová, I. Virgala, Ľ. Miková and F. Duchoň	511
Detection of Welds in Automated Welding F. Duchoň, M. Dekan, A. Babinec, L. Chovanec and A. Vitko	519
Design of Active Feedback for Rehabilitation Robot M. More and O. Liska	529
Innovation of Scavenging System to Increase Volumetric Efficiency of Internal Combustion Engines D. Šabadka and P. Trebuňa	536
Simulation and Analysis of Defect Distribution in Passenger Car Tire under Dynamic Loading J. Vavro, J. Vavro, P. Kováčiková, P. Kopas and M. Handrik	544
Analysis of Uncertainty of Tilt Measurement with Accelerometer T. Lipták, F. Duchoň, T. Kelemenová, M. Puškár, M. Kelemen, P. Kuryło and E. Prada	548