

Table of Contents

Preface

I. Computational Science as a Key Element of Engineering Progress

Simulation-Based Engineering Science Challenges of the 21st Century M. Stojek and J. Pietraszek	3
---	---

II. Computational Methods and its Application

Bootstrap Identification of Confidence Intervals for the Non-Linear DoE Model J. Pietraszek, N. Radek, M. Stojek, A. Goroshko and M. Kołomycki	11
Computation of Exterior Acoustics Problems in Two Dimensions by Trefftz-Type Finite Elements M. Stojek	17
Fuel Recognition Using Particle Swarm Optimization of Classification Trees L. Radziszewski and M. Kekez	23
Precision Mechanics of Contact Surfaces in the Transition from Stick to Slip J. Shalapko, N. Radek and J. Pietraszek	29
The Iterative Shooting Method Applied to the Modeling of the In-Run Profile of a Ski Jumping Hill R. Filipowska	37
The Modified Power Method for Solving the Eigenvalue Problem with the Use of Idempotent Matrix R. Palej, A. Krowiak and R. Filipowska	43
The Study of the Effect of Static Axial Loads on Vertically-Mounted Tapered Cantilever Transverse Vibrations Using the Cauchy Function J. Jaroszewicz, L. Radziszewski and Ł. Dragan	49
Assessment of GPU Computational Efficiency for Various Rendering Engines E. Kocylowska and M. Kołomycki	55

III. Applied Mechanics and Terotechnology

Analysis of Thick-Walled Pipeline Elements Operating in Creep Conditions P. Osocha and B. Węglowski	63
Evaluation of the Uncertainty of Selected Parameters that Characterise Diesel Engine Work A. Bąkowski and L. Radziszewski	69
Preliminary Research on Applying Self-Excited System for Bridge Stress Measurement I. Dominik, K. Lalik and R. Dwornicka	75
Analysis of Structure of Elements for Automotive Industry G. Sońta, A. Dudek, J. Selejdak and R. Ulewicz	81
Optimization of the Selection Process of Galvanic Coatings R. Ulewicz	87
Design of Continuous Passive Motion Machine Based on Kinematic Model of Lower Limb R. Dwornicka and I. Dominik	93

IV. Biotechnology Applications

Application of Advanced Statistical Methods in the Plant Biotechnology and Phytochemistry E. Skrzypczak-Pietraszek and J. Pietraszek	101
--	-----

Kinect Application as Virtual Patient Assistant on the Example of the Shoulder Pain Exercises

A. Gądek-Moszczak, B. Syzdek, P. Widzyk and N. Radek

107

The Analysis of Utility and Necessity of Construction and Modernization of the Devices for Lower Limb Passive Exercise

R. Dwornicka and I. Dominik

113