

Table of Contents

Preface

Chapter 1: Materials and Technologies in Mechanical Engineering

AQUASONIC – A Sounding Rocket Based on Hybrid Propulsion U. Apel, A. Baumann, C. Dierken and T. Kunath	3
New Kinematic Systems in Single-Sided Lapping and their Influence on Lap Wear A. Barylski and N. Piotrowski	14
Microgrinding with Diamond Electroplated Tools and with Single-Disk Lapping Kinematics A. Barylski and M. Deja	25
Evaluation of Applying Heuristic Algorithm to Solve Inverse Heat Conduction Problem in Temperature Oscillation IR Thermography Method R. Gałek	33
Failure Modeling of Hybrid Transition Structures V. Bitykov and F. Jablonski	44
Proportional-Derivative and Model-Based Controllers for Control of a Variable Mass Manipulator K. Lipiński	54
Distribution of the Mechanical Properties of a Complexly Deformed Component of Low Carbon Steel Influenced by Post-Heat Treatment P. Maier, F. Lenz, G. Tober and M. Kuttig	63
Development and Testing of Air Foil Bearing System for an Automotive Exhaust Gas Turbocharger U. Borchert, A. Delgado and J.A. Szymczyk	71

Chapter 2: Heat Transfer and Flow Engineering

Effect of Periodic Imposed Heat Flux on Three-Dimensional Natural Convection in a Partially Heated Cubical Enclosure L. Belarche and B. Abourida	83
Analysis of Heat Transfer and Fluid Flow in Two-Phase Thermosyphon Loop with Minichannels H. Bieliński and J. Mikieliewicz	92
Experimental Investigation on the Impact of Distorted Signal on Synthetic Jet P. Gil	104
Development of an Aeroelastic Flap to Increase the Aerodynamic Efficiency of a Wind Turbine's Rotor Blade F. Kortenstedde, J. Crombag, M. Twardzik, J.K.A. Langowski and B. Stanke	112
Experimental Investigations inside the Wind Tunnel at the University of Stralsund T. Panten and H. Meironke	117
Investigation of Coating Liquid Layer Behaviour at Curved Solid Edges O. Sommer and G. Wozniak	126
Gallium as a Metrology Substance for Measuring Thermal Conductivity of Metals F. Wolańczyk	144
Calculation Methodology of Defrosting Room for Rail Cars Z. Zapałowicz and L. Biały	151

Chapter 3: Properties and Practical Using of Nanofluids

Turbulence Model Evaluation for Numerical Modelling of Turbulent Flow and Heat Transfer of Nanofluids H. Boertz, A. Baars, J.T. Cieśliński and S. Smoleń	165
--	-----

Performance of the Flat Plate Solar Collector Operated with Water-Al₂O₃ Nanofluid J.T. Cieśliński, B. Dawidowicz and A. Popakul	181
Performance of a Plate Heat Exchanger Operated with Water-Al₂O₃ Nanofluid J.T. Cieśliński, A. Fiuk, W. Miciak and B. Siemieńczuk	188
Influence of Nanoparticle Concentration on Thermal Properties of Thermal Oil-MWCNT Nanofluid J.T. Cieśliński, K. Krygier and S. Smoleń	198
Influence of Nanoparticle Concentration on Convective Heat Transfer of Water-Al₂O₃ Nanofluids inside Horizontal Tubes J.T. Cieśliński and P. Kozak	208
Possibilities of the Use of the Electrolytic Technique for the Investigations of Mass/Heat Transfer in Nanofluid S. Grosicki	216
Coil Heat Exchanger with the Nanofluid Filled Buffer Layer R. Smusz and J. Wilk	223

Chapter 4: Machines and Technology of Conventional and Alternative Energy

The Experimental Investigation of the Biomass-Fired ORC System with a Radial Microturbine T.Z. Kaczmarczyk, G. Żywica and E. Ihnatowicz	235
The Experimental Investigation of Scroll Expanders Operating in the ORC System with HFE7100 as a Working Medium T.Z. Kaczmarczyk and E. Ihnatowicz	245
The Possibility of Co-Combustion of Gaseous Fuel in Compression Ignition Engines Z. Kneba	256
Stirling Engines Powered by Renewable Energy Sources J. Kropiwnicki and A. Szewczyk	263
Management of Low-Temperature Heat Source by ORC Aided by Additional Heat Source D. Mikielwicz, J. Wajs, M. Bajor and E. Żmuda	270
Numerical Method Approach to Calculate Earth-Energy of Earth-Pipe-Air Heat-Exchanger for Winter Heating V.F.A. Molcrette, V.R.B. Autier, L. Zalewski and S. Lassue	278
Numerical Modeling of the Combustion in a Lab-Scale Pulverized-Coal Fired Combustion Chamber K. Ronewicz, D. Sawicka, J.T. Cieśliński and S. Smoleń	286
Experimental and Theoretical Investigation over the Wood Permeability to Air as a Function of Pyrolysis Temperature K. Ronewicz and D. Kardaś	295
Optimization of Overcritical Organic Rankine Cycle Q.Q. Wang and S. Smoleń	306
Technology Development and Conceptual Design of a Test Stand for the Optimization of a Gasification Process T. Wurzler, U. Borchert, L. Wittmann and J.A. Szymczyk	316
Selected Problems of Small Biogas Fueled CHP Unit Design M. Ziolkowski	325