

TECHNICAL UNIVERSITY OF ŁÓDŹ

Volume 7

Number 2, 2004

**Mechanics
and
Mechanical
Engineering**

Editor in Chief: Tomasz Kapitaniak

Łódź, Poland

**MECHANICS AND
MECHANICAL ENGINEERING
International Journal**

Editor in chief – Tomasz Kapitaniak

Mechanics and Mechanical Engineering
Editorial Office

Division of Dynamics, Technical University of Łódź
90-924 Łódź, Poland, Tel. (48 42) 636 68 22

Editorial board

J. Brindley – Leeds	W. Ostachowicz – Gdask
W. Kaniewski – Łódź	Z. Peradzyński – Warsaw
Z. Kazimierski – Łódź	B. Skalmierski – Częstochowa
M. Królak – Łódź	W.-H. Steeb – Johannesburg
K. Li – Michigan	C. Szczepaniak – Łódź
J. Manevich – Dniepropetrovsk	A. Tylikowski – Warsaw
A. Nayfeh – Blacksburg	K. E. Thylwe – Stockholm
M. S. El Naschie – Cambridge	M. Wiercigroch – Aberdeen

Editorial Secretary: I. Słowianek

Scope of the journal

Mechanics and Mechanical Engineering publishes original papers, notes, and invited review articles from all fields of theoretical and applied mechanics as well as mechanical engineering. In addition to the classical fields, such as Rigid Body Dynamics, Elasticity, Plasticity, Hydrodynamics and Gas Dynamics, it gives special attention to recently developed and boundary areas of mechanics. As a rule, only contributions written in English will be accepted.

Copyright Tomasz Kapitaniak, 2002-2004

Submission of manuscript implies: that the work described has not been published before (except in the form of an abstract or as part of a published lecture, review, or thesis); that is not under consideration for publication elsewhere; that its publication has been approved by all coauthors, if any, as well as by the responsible authorities at the institute where the work has been carried out; that, if, and when the manuscript is accepted for publication, by authors agree to automatic transfer of the copyright to the publisher; and that the manuscript will not be published elsewhere in any language without consent of the copyright holders.

CONTENTS

Andrzej TYLIKOWSKI	
Stability of Functionally Graded Plate under In-Plane Time-Dependent Compression	5
S. A. EL-KHOLY	
The Exact Solution of Nonlinear Stress-Free Convection Under the Influence of Magnetic Fields	13
Yusry O. EL-DIB and Osama E. ABD EL-LATIF	
Instability of Darcian Flow in an Alternating Magnetic Field	23
M.F. DIMIAN and M.Kh. HADHODA	
Natural Convection Flows with Variable Viscosity, Heat and Mass Diffusion Along a Vertical Plate	61
Mohamed I.A. OTHMAN	
The Uniqueness and Reciprocity Theorems for Generalized Thermo-Viscoelasticity with Thermal Relaxation Times	77
I.A. HASSANIEN, F.S. IBRAHIM and Gh.M. OMER	
Unsteady Free Convection Flow in the Stagnation-Point Region of a Rotating Sphere Embedded in a Porous Medium	89
Ismail A. KHOLEIF and Bedier B. EL-NAGGAR	
Correction of the Diffusion Equation	101
Osman M. KAMEL, Adel S. SOLIMAN, Medhat K. AMMAR	
The Change in the Hyperbolic Orbital Elements Due to Application of a Small Impulse	109
Bedier B. EL-NAGGAR and Ismail A. KHOLEIF	
Unsteady Emptying of a Pressure Vessel	121
Ahmed E. RADWAN and Magdy A. ELTAWHEEL	
Axisymmetric MHD Oscillation of a Compressible Hollow Jet	127

Nabil T. M. EL-DABE, Sallam N. SALLAM and A. Y. GHALY	
Oscillatory Non-Newtonian Viscoelastic Fluid Flow Past a Porous Bed	131
Zbigniew STARCZEWSKI	
Effect of Geometrical Orientation of Three-Lobe Slide Bearings on Amplitude of Resonant Vibration of an Unsymmetric Supported Rotor	131
Nabil T.M. EL-DABE, Ahmed A.A. HASSAN, A.Y. GHALY	
Radiation and Thermal Diffusion Effects on MHD Unsteady Maxwell Fluid Past a Porous Flat Plate Through Porous Medium	153
Mohamed I.A. OTHMAN	
Relaxation Effects on Thermal Shock Problems in an Elastic Half-Space of Generalized Magneto-Thermoelastic Waves	165
Mostafa M. ABDEEN	
Artificial Neural Network Model for Predicting the Impact of Changing Water Structures' Locations on the Hydraulic Performance of Branched Open Channel System	179
Lech BRZESKI, Zbyszko KAZIMIERSKI and Jerzy WOJEWODA	
Flow in a New Type Externally Heated Air Engine with Two Blowers	193