

Yongqi Wang, Kolumban Hutter (Eds.)

*Trends in Applications of
Mathematics to Mechanics*

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Trends in Applications of Mathematics to Mechanics
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Berichte aus der Mathematik

**Yongqi Wang
Kolumban Hutter (Eds.)**

**Trends in Applications of
Mathematics to Mechanics**

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Preface

This book on **Trends in Applications of Mathematics to Mechanics** consists of peer-reviewed articles and reviews presented at the *International Symposium on Trends in Applications of Mathematics to Mechanics* (STAMM), held at the Lufthansa training centre, Seeheim, Germany, August 22 – 28, 2004. It is the fourteenth in a series of meetings under the auspices of the *International Society for the Interaction of Mechanics and Mathematics* (ISIMM).

In 1975 a group of researchers established the ISIMM society in order to improve the existing interactions of Mechanics and Mathematics. It is well documented that the subjects of Mechanics and Mathematics have benefited enormously from mutual stimulation and this process continues to thrive in the present days. Obvious examples are the development of symplectic geometry and the theory of dynamical systems which the study of mechanics may generate but in the continuing genuine interaction between these subjects. Hence, it is concerned to explain and describe new phenomena in mechanics, which in requiring development of fundamentally new mathematical ideas leads to the enrichment of both subjects. Of course, mechanics is to be interpreted in very broad terms and includes, for instance, diffusive processes associated with materials science. The Society fosters the aims of its members by means of a series of bi-annual international meetings held in different locations. The last two symposia were held in Galway, Ireland (2000) and in Naples, Italy (2002), respectively. The present was held in Seeheim, Germany (2004).

This symposium was organized by the Institute of Mechanics at Darmstadt University of Technology (TUD) and the International Society for the Interaction of Mathematics and Mechanics (ISIMM). 120 scientists from 25 countries attended this symposium.

The symposium served both as a forum for the review and dissemination of recent scientific and technical information related to all aspects of the interaction of mathematics and mechanics, and as a means of encouraging cooperation and stimulation for future research. The topics that are particularly treated, may be headed as follows:

- Linear and nonlinear waves in continuous media;
- Granular and particle laden media;
- Phase transitions, hysteresis;
- Poroelastic, granular waves;
- Elasto-visco plasticity, rate-independent materials;
- Polar, nonpolar elasticity;
- Fluid, convection-diffusion, turbulence;
- Non-Newtonian fluids, liquid crystals;
- Thermodynamics (extended/normal), Statistical mechanics;
- (Geophysical) Fluid Dynamics, Boundary layers;
- Discrete Element Methods (DEM) / Numerics;
- Magneto-electro mechanics;
- General continuum mechanics;
- Beams, plates, shells, thin sheets, thin layers;

II Preface

- Inhomogeneities;
- Crack propagation, fracture, Ice;
- Gradient and Cosserat theories;
- Structure fluid interactions;
- Miscellaneous.

We decided to perform thorough reviews of the contributing papers and to present the selected papers together as a formal book, because the content is of general interest to graduate students, researchers and engineers in universities and research institutions involved in mathematics and mechanics. The book contains 64 selected articles, most, but not all, of the lectures that were presented at the symposium. The articles are listed in alphabetical order accordingly to the names of the first authors.

We sincerely hope that this volume adequately adds to our current understanding of the interaction of mathematics and mechanics, and that it will also stimulate further research.

Darmstadt, December 2004

The Editors

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The Editors

Contents

Preface	I
Acknowledgments	III
Nonlinear Wave in Finite Deformation of a Composite Layer <i>Ade Akinola</i>	1
Universal Unfolding of Pitchfork Bifurcations and Shear-Band Formation in Rapid Granular Couette Flow <i>Meheboob Alam</i>	11
Numerical Analysis of Monochromatic Surface Waves in a Poroelectric Medium <i>Bettina Albers</i>	21
Boundary Conditions in Extended Thermodynamics and Applications <i>Elvira Barbera</i>	31
Non-Equilibrium Description and Numerical Simulation of Phase-Transition Front Propagation in Thermoelastic Solids <i>Arkadi Berezowski, Gérard A. Maugin</i>	41
Unsheared Triads in Strain and Straining <i>Philippe Boulanger, Michael Hayes</i>	51
Nonlinear Resonance of Waves in Inhomogeneous Materials <i>Andres Braunbrück, Arvi Ravasoo</i>	61
Experimental and Numerical Investigations of Pure Viscous and Weakly Elastic Viscous Flows in Bifurcations <i>D. Broboana, T. Muntean, C. Balan</i>	67
On Conservation Laws with Discontinuous Flux <i>Raimund Bürger, Kenneth H. Karlsen, Siddhartha Mishra, John D. Towers</i>	75
A Theory of Perfect Hyperfluids <i>Gianfranco Capriz, George Mullenger</i>	85
Extended Description of Pore Space Structure and Fluid Flow Through Anisotropic Porous Materials. Application of Minkowski Space <i>Mieczysław Cieszko</i>	93
A Two-Scale Phase Field Model for Phase Transitions with Equiaxed Dendritic Microstructure	

<i>Christof Eck</i>	103
On Acceleration Waves in Continua with Large Pores	
<i>Pasquale Giovine</i>	113
Physically Acceptable Viscoelastic Models	
<i>Andrzej Hawyga</i>	125
The Geometry of Nonhomogeneous, Non-equilibrium Thermodynamics Based on Maximum Dissipation	
<i>Henry W. Haslach, Jr.</i>	137
Numerical Analysis Method with Particle Discretization for Failure Phenomena	
<i>Muneo Hori, Kenji Oguni</i>	147
Couette Flow of Dry Granular Materials	
<i>Christophe Josserand, Pierre-Yves Lagr��e, Daniel Lhuillier</i>	157
Uniqueness and Continuous Data Dependence for the Linear Thermoelastic Dielectric	
<i>R J Knops, C. Trimarco</i>	165
Non-Self-Similar Development of a Reflected Wave of Mach Reflection	
<i>Susumu Kobayashi, Takashi Adachi, Klaus Debatin, Torsten Schenkel, Herbert Oertel, Jr.</i>	173
Particle Production Mechanisms in the Early Universe and a Description of Its Eras	
<i>Gilberto M. Kremer, Daniele S. M. Alves</i>	183
An Exact Solution of Navier-Stokes Equations for the Study of Vapor Flow in Cylindrical Heat Pipes	
<i>Mohammad Layeghi</i>	193
A New Dumbbell-Like Model for Dilute Polymer Solutions	
<i>Daniel Lhuillier, Uktam R. Salomov, Ali Nadim</i>	205
The Folgar–Tucker Model as a Differential Algebraic System for Fiber Orientation Calculation	
<i>Jochim Linn</i>	215
On Well-Posedness of Classical Boundary Conditions in Extended Thermodynamics	
<i>I-Shih Liu</i>	225
Strip-Plate Divergence as Bifurcational Problem with Two Spectral Parameters	
<i>B. V. Loginov, A. V. Tsyganov, O. V. Kozhevnikova</i>	235
Effects of Capillarity on a Joule-Thomson Process of a Fluid near Saturation	
<i>Thomas Loimer</i>	247

A Thermodynamic Model of Turbulent Motions of a Multiphase Granular Mixture	
<i>Ioana Luca, Kolumban Hutter</i>	257
Master Curves for Viscous Media Predicted from Symmetry Analysis	
<i>Vincent Magnenet, Rachid Rahouadj, Jean-Francois Ganghoffer, Christian Cunat</i>	267
Computer Realization of the Branching Equation Construction on Allowed Group Symmetry	
<i>Oleg Makeev, Boris Loginov</i>	277
Remarks on the Mechanical Response of Simple Directionally-Reinforced Incompressible Nonlinearly Elastic Solids	
<i>J. Merodio, R.W. Ogden</i>	289
Modeling and Analysis of Rate-Independent Processes in Continuum Mechanics	
<i>Alexander Mielke</i>	299
On Propagation of Longitudinal and Transverse Waves in Initially Stressed Linearly Elastic Media	
<i>Adriano Montanaro</i>	311
Wave Propagation in a Linear Viscoelastic Layer: Existence and Uniqueness in the Frequency Domain	
<i>Angelo Morro</i>	315
Entropy and Energy – A Universal Competition	
<i>Ingo Müller, Wolf Weiss</i>	325
Constitutive Mappings and the Non-objective Part of Material Frame Indifference	
<i>W. Muschik, L. Restuccia</i>	331
On Material Constants for Micromorphic Continua	
<i>Patrizio Neff</i>	337
Flow Induced Vibrations of Long Flexible Plates in an Axial Incompressible Flow	
<i>N.M. Nouri, M. Layeghi</i>	349
Instability and Ill-Posedness in the Deformation of Plastic Solids: Some Correlations Through Simple Examples	
<i>Vladimir A. Osinov, Wei Wu</i>	361
Nonlinear Surface Waves and Nonlocality	
<i>D.F. Parker</i>	371
Balance Equations for Polycrystalline Materials with the Inclusion of Orientation and Grain-size Distributions	
<i>Luca Placidi, Kolumban Hutter</i>	381
Modelling the Evolution of Inhomogeneities	
<i>Serge Preston, Marek Elżanowski</i>	391

On Spatial Decay Estimates for Nonsimple Theories <i>Ramón Quintanilla</i>	399
Calculation of Fluid-Solid Interaction at Transonic Wind Tunnel Testing <i>Boško Rašuo</i>	409
Coordinate Invariant Modelling of the Ferroelectric Hysteresis within a Thermodynamically Consistent Framework. A Mesoscopic Approach <i>Holger Romanowski, Jörg Schröder</i>	419
Incompressible Fluid Mixtures of Ionized Constituents <i>Tomáš Roubíček</i>	429
Discrete Element Simulation of the Mixing Time of Granular Solids in Rotary Drums <i>Gabriela Saage, Marzena Kwapinska, Evangelos Tsotsas</i>	441
Extended Thermodynamics as Modeling Tool of Turbulence in Fluid Flows <i>Amsini Sadiki</i>	451
Hyperbolic-Parabolic and Parabolic-Parabolic Phase Transitions <i>Katarzyna Saxton, Ralph Saxton</i>	463
Numerical Relaxed Solution of the Dam-Break Flows without Riemann Problem Solvers <i>Mohammed Seaid</i>	473
DEM Simulations of Toner Behavior in the Development Nip of the Océ Direct Imaging Print Process <i>I.E.M. Severens, A.A.F. van de Ven</i>	483
Instability and Bifurcations in Conical Flows <i>Vladimir Shlern</i>	493
Experimental Evidence for the Slow Compressional Wave in Poro-Elastic Media <i>David Smeulders</i>	499
A Viscoplastic Double-Shearing Theory <i>A.J.M. Spencer</i>	509
A Multiphase Continuum-Based Model Capturing Erosion and Deposition <i>Holger Steeb, Stefan Diebels, Ioannis Vardoulakis</i>	519
Mesoscale Mathematical Modeling of Intercalation in Battery Materials <i>Lev Steinberg</i>	529
Multiple Scales and Bifurcation Problems in Boundary Layer Theory <i>Herbert Steinrück, Stefan Braun, Alfred Kluwick</i>	539
Excitation of Modes in a Nonlinearly Coupled High-T_c Superconducting Levitation System <i>Toshihiko Sugiura, Takahiro Inoue</i>	549

Non-Newtonian Fluid Flows in a Falling Cylinder Viscometer <i>Victor Tigoiu, Corina Cipu</i>	559
Maxwell's Equations Coupled with Vector Hysteresis <i>Augusto Visintin</i>	569
Linear Sound Waves in Poroelastic Materials: Simple Mixtures vs. Biot's Model <i>Krzysztof Wilmanski</i>	579
A Thermodynamically Consistent Model in Small Deformations of the Material Behaviour of Steel Including Phase Transformations, Classical and Transformation-Induced Plasticity <i>Michael Wolff, Michael Böhm, Alfred Schmidt</i>	591
A Mathematical Model Describing a Floating Structure - Water Interaction System Impacted by an Aircraft Landing <i>Jing Tang Xing, Jingzhe Jin, W. G. Price</i>	603
A Substructure-Subdomain Method to Evaluate Power Flow Characteristics of a Beam-Water Interaction System <i>Jing Tang Xing, Ye Ping Xiong, W. G. Price</i>	615
Nonlinear Behavior of an Annular Viscous Liquid Sheet <i>Takao Yoshinaga, Kentaro Kan, Kazunori Mitomi</i>	627