Contents

CENS, CMA and the CENS-CMA Project 1
Jüri Engelbrecht, Ragnar Winther & Ewald Quak

Part I Waves in Solids

Overview 9
Arkadi Berezovski

Deformation Waves in Solids 13
Jüri Engelbrecht

The Perturbation Technique for Wave Interaction in Prestressed Material 31
Arvi Ravasoo

Waves in Inhomogeneous Solids 55
Arkadi Berezovski, Mihhail Berezovski and Jüri Engelbrecht

Part II Mesoscopic Theory

Overview 85
Wolfgang Muschik

Dynamics of Internal Variables from the Mesoscopic Background for the Example of Liquid Crystals and Ferrofluids 89
Christina Papenfuss

Towards a Description of Twist Waves in Mesoscopic Continuum Physics 127
Heiko Herrmann

Part III Exploiting the Dissipation Inequality

Overview 149
Wolfgang Muschik

Weakly Nonlocal Non-equilibrium Thermodynamics – Variational Principles and Second Law 153
Péter Ván

Part IV Waves in Fluids

Overview 189
Tarmo Soomere

Long Ship Waves in Shallow Water Bodies 193
Tarmo Soomere

Modelling of Ship Waves from High-speed Vessels 229
Tomas Torsvik

New Trends in the Analytical Theory of Long Sea Wave Runup 265
Ira Didenkulova

Part V Mathematical Methods

Overview 299
Ewald Quak

The Pseudospectral Method and Discrete Spectral Analysis 301
Andrus Salupere

Foundations of Finite Element Methods for Wave Equations of Maxwell Type 335
Snorre H. Christiansen

An Introduction to the Theory of Scalar Conservation Laws with Spatially Discontinuous Flux Functions 395
Nils Henrik Risebro

Index 465