

## PREFACE

The development of interest in the behaviour of solids has been determined by the investigation of the mechanical properties of materials such as pastes, metals, soils, polymers, rubbers and rocks. In the past decades, a significant development has occurred in the description of constitutive equations for solid materials, as well as in the modelling of thin structures (shells, plates and rods). Mechanical processes involving solid bodies are abundant in industry and everyday life, and play an important role in engineering structures and systems. They include a large variety of phenomena, and therefore are modelled with highly complex and non-linear initial-boundary value problems.

The need for a comprehensive well-posed mathematical theory based on fundamental physical principles that can reliably predict the evolution of solid bodies in different situations and under various conditions was recognised long ago, but the tools needed for realising this goal have been developed only in recent years. Such a mathematical theory is emerging currently; it deals with the rigorous modelling of these processes, their variational analysis and their numerical approximation. It uses advanced mathematical methods, and results from such topics as variational inequalities, asymptotic methods, convex and non-convex analysis, set-valued operators, evolutionary equations, finite difference and finite element approximation.

The aim of this special issue of the *International Journal of Applied Mathematics and Computer Science* is to present some recent contributions concerning the study of non-linear problems in solid mechanics, in order to provide the reader with an overview of the mathematical modelling and numerical approximation methods that can be applied in this field. The volume contains twelve rigorously selected papers that present a large variety of results, covering the area ranging from the mathematical models to numerical solutions and engineering applications.

We wish to express our gratitude to the authors for their valuable contributions to this special issue of the Journal. We extend our thanks to the reviewers for their very helpful comments, which have improved the final versions of some papers—we really appreciate their professionalism. We would also like to express our sincere thanks to the Editor-in-Chief, Professor Józef Korbicz, for inviting us to work as guest editors of the present issue of the Journal.

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