Preface

This special issue is devoted to *Discontinuous Dynamical Systems: Theory and Numerical Methods*. The idea to collect recent results within the rapidly growing area of discontinuous dynamical systems grew out of informal discussions during SDS10 - 6th Workshop on Structural Dynamical System: Computational Aspects, 8-11 June 2010 in Hotel Porto Giardino, Monopoli, Italy, which is a biannual workshop organised by the Department of Mathematics of the University of Bari.

Systems with discontinuities are sometimes referred to as discontinuous dynamical systems (DDSs) or nonsmooth dynamical systems (NSDSs), which are both collective names to encompass such systems in the broadest sense. The mathematical formalisms that are commonly used for analysis of DDSs are differential inclusions, complementarity dynamical systems, evolution variational inequalities and piecewise-smooth systems. The common point between all these formalisms is a certain lack of smoothness within the equations and correspondingly a lack of smoothness of the solutions such that some are at most continuous.

Approximately half of the articles in this special issue are describing numerical methods for DDSs and the other half is analysing dynamical features of DDSs. This collection of articles highlights the fine balance between careful numerical methods for simulation and analysis on one hand and theoretical analysis of discontinuous discrete and continuous system through analytic and semi-analytic methods on the other. In particular, the special issue underlines the fact that there are still many unanswered questions in relation to systems with discontinuities but at the same time the interest in tackling these questions is growing. As a consequence, and evident from all the contributions, a special issue on DDSs will undoubtedly be multi-disciplinary and span basic and applied topics in mathematics, numerical analysis, control theory and engineering. We believe the breadth of topics covered in this special issue will be useful to a wide readership interested in discontinuous dynamical systems.

To conclude, we wish to thank the authors for their contributions and cooperation in preparing this Special Volume, the referees for their help in improving the submitted works. We are also grateful to the Editor-In-Chief, Prof. Robert Beauwens for having offered us the opportunity to present this volume and to France Pinon for the editorial help given during these months.

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