

# Preface

This book contains the contributions presented during the *Russia-Austria Joint Workshop on Advanced Dynamics and Model Based Control of Structures and Machines*, which took place at the Johannes Kepler University of Linz, Austria, in April 2010. The workshop aimed at bringing together scientists from Russia and Austria with an outstanding expertise in mechanics and control, with emphasis on the application to advanced structures and machines. The international character of the workshop was deepened by the participation of widely renowned scientists from Italy, Japan and Taiwan. The workshop continued a series of international workshops, which started with a *Japan-Austria Joint Workshop on Mechanics and Model Based Control of Smart Materials and Structures* that took place in Linz, Austria, in September 2008.

This series of workshops is organized within the framework of the *Area Mechanics and Model Based Control* of the *Austrian Center of Competence in Mechatronics (ACCM)*. This peer-reviewed Center served as the Steering Organisation for the workshop series. Mechanics and Model Based Control are rapidly expanding scientific fields and fundamental disciplines of engineering, particularly in Mechatronics. They share demanding mathematical and/or system-theoretic formulations and methods. One challenge in Mechanics and Model Based Control is to use the ever increasing computer power with respect to both, the simulation of complex physical phenomena in mechanics, and the design and real-time implementation of novel control systems. Further challenges follow from the availability of efficient multi-functional materials, so-called smart materials, allowing the design and implementation of new types of actuator/sensor fields and networks. From a strategic point of view, the key objectives of the workshop series are:

- Enabling the interchange of ideas from advanced mechanics of structures and machines, and from control theory.
- Clarification of expectations of researchers in the field of mechanics from advanced control theory and vice versa.

- Development of joint international research proposals and teams.
- Encouragement of collaborations among industry and universities across the borders of the participating countries.

The main topics of the present *Russia-Austria Joint Workshop* were:

- Laminated, composite and functionally graded materials.
- Sensing and actuation.
- Active and passive damping.
- Vibrations and waves.
- Nonlinear control of structures and systems.
- Nano- and micromechanics.

We believe that the workshop will finally result into the creation of research teams with participation not only from Russia and Austria, but also from other countries. Such teams should push the frontiers of advanced dynamics and model based control of structures and machines to new dimensions, resulting into the advanced design of future structures.

The undersigned Editors of the present book, which is entitled *Advanced Dynamics and Model Based Control of Structures and Machines* are happy to present in the following 8 full length papers of presentations from Russia, 12 from Austria, 2 from Italy, 3 from Japan and one paper from Taiwan. It is hoped that these contributions will further stimulate the international research and cooperation in the field.

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*Hans Irschik*  
*Michael Krommer*  
*Alexander Belyaev*

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Irschik, H.; Krommer, M.; Belyaev, A.K. (Eds.)

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