A R C H I V E O F M E C H A N I C A L E N G I N E E R I N G

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P R E F A C E

Multibody system dynamics, a branch of computational mechanics dealing with modeling principles and computational methods for dynamic analysis, simulation, and control of mechanical systems, is a rapidly developing field that allows for virtual prototyping and simulation of a large spectrum ofindustrial products. Those range from thestandardindustrial production,includingall kinds of vehicles, rotational machines and mechatronical devices, to recent products at the nanodimensional level of the biomolecular structures and smart materials. Such versatility of applications is rooted in the characteristics of the basic modeling principles the discipline is starting from, which, being based on kinematical and dynamical coupling of the rigid and flexible bodies of different characteristics andmechanical properties, serve as a successfulmodeling framework for such a broad class of objects in engineering and applied physics.

To cope with more and more challenging applications in the context of more demanding materials, exploitation conditions and design requirements, the discipline had to develop and incorporate different modeling-methodologies that found their successful co-existence within the framework of contemporary multibody dynamics computational models. Indeed, since its establishment in the 1970s as a discipline that primarily focused on the rigid body mechanisms and mechanical systems, multibody system dynamicshas grown today as a field that offers solutions for various modeling, optimization,and control tasks of quite complex highly developed industrial products that often include multiphysics approaches, computational coupling techniques, geometric integrators or multi-scale modelling techniques.

All these aspects, and many more relevant topics of the contemporary multibody dynamics, were discussed during the ECCOMAS Thematic Conference on Multibody Dynamics 2015 that was held at the Barcelona School of Industrial Engineering, Universitat Politècnica de Catalunya, Spain in

June-July 2015. The objective of the conference was to present the state of the art in the theory and applications of multibody system dynamics, to provide a forum for discussion on relevant research issues, and to serve as a meeting point for the international researchers, scientists and experts from academia, research laboratories and industry working in the area of multibody dynamics. The conference brought together 360 participants from 35 countries, spanning the 5 continents, with a total number of 285 presentations including the 4 keynote lectures.

This special issue of AME consists of selected, revised and extended versions of papers presented at the conference, reporting on the state-of-the-art in the advances of computational multibody dynamics, from the recent theoretical developmentsto diverse practical engineering applications.We would like to thank all the authors for the time and effort they devoted to the completion of their contributions. We would also like to thank all reviewers for their expert work during reviewing the articles. Their assistance has been very valuable in shaping the final version of the published papers.

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