MECHANICS COLLOQUIUM

Friday, March 30, 2007,
12:45-13:30 h.
Delft University of Technology
Faculty of Mechanical Engineering
Mekelweg 2, Delft
Room C

Multidisciplinary Applications Using Multibody Dynamics as the Framework for Developments

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Abstract – A number of examples of the research carried at IDMEC and the different collaborative works will be presented. These applications involve:

- passive safety of road and rail vehicles
- impact and human locomotion biomechanics
- automotive and railway dynamics
- control of multibody systems

In the process of presenting the different applications potential future developments are discussed.

The framework for development can be described as follows. The structure of the equations of motion of multibody systems allows the incorporation of the equilibrium equations of a large number of disciplines and their solution in a combined form. The description of the structural deformations exhibited by the system components by using linear or non-linear finite elements in the framework of multibody dynamics is an example of the integration of the equations of equilibrium of different specialties. Of particular importance in the applications pursued with the methodologies proposed is the treatment of contact and impact which are introduced in the multibody systems equations either by using unilateral constraints or by applying a continuous contact force model. The readily availability of the state variables in the multibody formulation allows for the use of different control paradigms in the framework of vehicle dynamics, biomechanics or robotics and their easy integration with the multibody equations.

About the speaker - Jorge Ambrósio is Professor at the Instituto Superior Técnico of the Technical University of Lisbon, Portugal. He got his PhD (1991) from the University of Arizona in Mechanical Engineering advised by Parviz Nikravesh on crash analysis within a flexible multibody dynamics environment. He is author of more than 80 papers in International Journals and over 200 papers in international conferences in the fields of Computational Dynamics, Multibody Dynamics, Biomechanics, Vehicle Dynamics, Crashworthiness, Finite Elements and Flexible Multibody Dynamics. He is Editor-in-Chief of the international journal Multibody Systems Dynamics and member of the editorial boards of several international journals. Recently he started the Lisbon Biomechanics Laboratory for which he is the coordinator. (jorge@dem.ist.utl.pt and http://www.dem.ist.utl.pt/IDMEC/). Local host: Arend L. Schwab.