IUTAM International Union of Theoretical and Applied Mechanics

IUTAM Symposium - Dynamical Analysis of Multibody Systems with Design Uncertainties

The Symposium will take place in Stuttgart, Germany, from June 10 to June 13, 2014.

A common problem in the analysis of mechanical systems is the fact that the parameters of the models can exhibit a high level of uncertainty and exact values for their quantification can often not be provided. This non-determinism in numerical models may arise as a consequence of different sources. On the one hand, there may be natural variability or scatter. On the other hand, there may be uncertainties which arise from a lack of information, e.g. for parameters to be still defined during the design phase of a product, but also from simplification and idealization as it usually appears in every modeling procedure. These conditions manifest as uncertain model parameters, and consequently, the results that are obtained for analyses of systems that only use one specific set of values as the most appropriate ones for the design parameters cannot be considered as reliable, for they are not representative of the whole spectrum of possible model configurations.

Against this background, various approaches to the inclusion of uncertainties in the numerical analysis of dynamical systems and structures have been introduced in the past decades, involving probabilistic as well as non-probabilistic techniques. Supported by the increasing capabilities of modern high-performance computing, these advanced, non-deterministic approaches to the dynamical analysis of mechanical systems can strengthen the trustworthiness of numerical predictions and provide new possibilities in the processes of product development, such as engineering design and virtual prototyping, beyond the means of conventional, deterministic concepts.

The aim of this IUTAM Symposium is to give a state of the art of the potentials, challenges and limitations of different approaches to the analysis of mechanical systems in the presence of design uncertainties. The topics will range from probabilistic methods to approaches based on interval descriptions or fuzzy sets, from linear to nonlinear problems, from forward analyses to inverse problems, from theoretical developments to practical applications, and from the analysis of structures to multibody systems dynamics.