

## **Dynamics of Mechanical Systems with Contact Problems: From Fundamentals to Applications**

Multibody dynamics deals with the study of mechanical systems composed of multiple bodies, whose motion interactions are governed by the presence of kinematic constraints and by the application of external forces. The prediction of the dynamic behavior of multibody mechanical systems typically involves the formulation of the governing equations of motion and the numerical evaluation of their kinematic and dynamic characteristics. Thus, this lecture focuses on the application of multibody dynamics methodologies in the fields of mechanical and biomedical engineering, when contact and impact events are present. For this purpose, the main ingredients related to the formulations of multibody systems with contact-impact events is presented. In the sequel of this process, special attention is given to the regularized or continuous models to treat frictional contacts. Moreover, relevant numerical ingredients associated with contact-impact phenomena in multibody dynamics are examined with the intent to discuss the computational accuracy and efficiency. Finally, results for some multibody systems in the context science and engineering are utilized to discuss the potential of applications of the multibody dynamics tool in these two emerging scientific areas.

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