

## **ABSTRACT**

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The central goal of this work is to put in an unified framework Dynamics, Identification and Control of multibody systems. A multibody system is a mechanical system constituted of interconnected rigid and deformable components which can undergo large translational and rotational displacements. The description of the motion of multibody systems is the leitmotif of Multibody Dynamics. On the other hand, System Identification is the art of determining a mathematical model of a physical system by combining information obtained from experimental data with that derived from an a priori knowledge. In addition, the System Identification methods can be successfully employed to refine a multibody model obtained from fundamental principles of Dynamics by using experimental data. In particular, applied System Identification methods allows to get modal parameters of a dynamical system using force and vibration measurements. On the other hand, the raison d'être of Control Theory is to study how to design a control system which can influence the dynamic of a mechanical system in order to make it behave in a desirable manner. Consequently, it is intuitive to understand that these three seemingly unconnected subjects (Multibody Dynamics, System Identification, Control Theory) are actually strongly linked together. Therefore, the study of one of these subjects cannot be separated from the study of the other two. The structure of this works represents an attempt to encompass the essence of Multibody Dynamics, System Identification and Control Theory.