On the Modelling of Contact Forces in the Framework of Rigid Body Dynamics

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The modelling of dynamical systems with mutual interaction through normal and tangential forces between surfaces is one of the most important tasks in the current computational research. The paper deals with the formulation of the equations of motion in dynamics of multibody systems and subsequent usage of various contact force models. Four types of normal force calculations are introduced and their behaviour is demonstrated using a simple example of a sphere moving towards a plane. The parametric study of the contact models with respect to the coefficient of restitution and an exponential parameter is performed. In order to show a more practical usage the simplified dynamic model of a nuclear reactor control assembly is created and its dynamic response is discussed. The model is characterized as a falling rigid body in a narrow channel filled by a fluid.

Keywords: multibody dynamics, equation of motion, normal force, friction force, control assembly

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