

Mathematical Modelling in Contact Mechanics

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Contact phenomena between deformable bodies abound in industry and everyday life. A few simple examples are brake pads in contact with wheels, tires on roads, and pistons with skirts. Because of the importance of contact processes in structural and mechanical systems, considerable effort has been put into their modeling, analysis and numerical simulations and, consequently, the Mathematical Theory of Contact Mechanics (MTCM) has undergone a great development, especially in the last decades.

The aim of this lecture is to present an introduction to the MTCM. Thus, we present various mathematical models which describe the contact of elastic or viscoelastic materials with a rigid or deformable foundation. We show how these models lead to nonsmooth problems, expressed in terms of variational and hemivariational inequalities, inclusions or sweeping processes, for which we present existence, uniqueness, convergence and well-posedness results. We complete our presentation with numerical simulations and mechanical interpretations

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