

EFFECT OF MECHANICAL PROPERTIES OF CONTACTING BODIES ON DECELERATION PROCESS

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ABSTRACT

The paper is devoted to the study of the deceleration process of the cylinder (1) rolling over the base from the same material (2) taking into account the normal and shear stress distribution within the contact area (Fig.1). It is assumed that the contact region consists of the slip and stick zones. The solution of the contact mechanics problem [1] is used to evaluate the contact stresses at various values of velocities and relative slippage. The elastic and viscoelastic mechanical models of contacting bodies are considered [2,3].

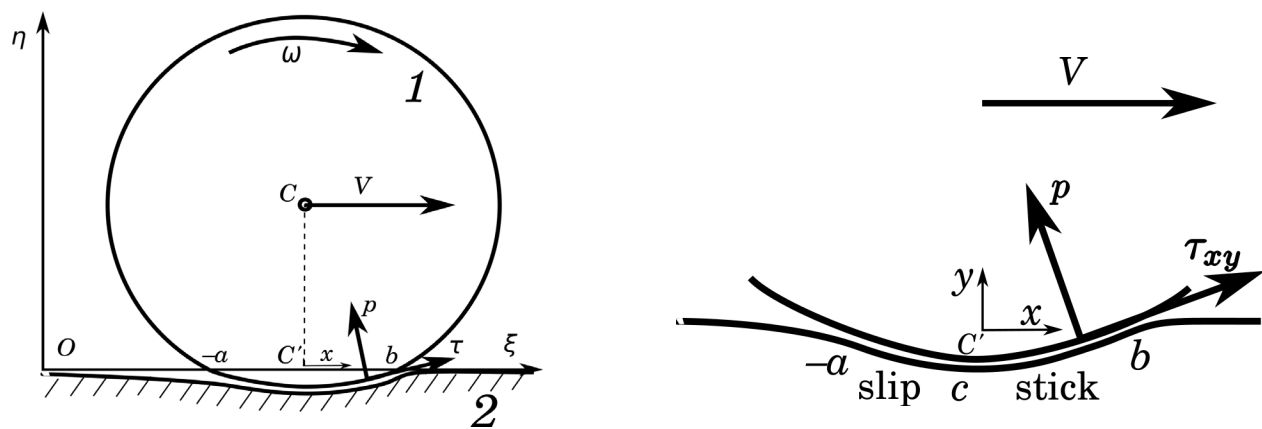


Figure 1: Scheme of the contact

Based on the model analysis it was concluded that in the general case of the viscoelastic contacting bodies the deceleration process depends on the following dimensionless parameters: friction coefficient, dimensionless material compliance, ratio of relaxation to retardation times, dynamic time scale parameter. The influence of these parameters as well as the initial values of linear and angular velocities on the deceleration process and the phase portrait of the system is discussed [4].

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Keywords: Viscoelastic materials, Dynamic problem, Rolling with slipping

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