

Further Development of the Theory of Multicomponent Dry friction

Alexey A. Kireenkov*,

* Institute for Problems in Mechanics of the Russian Academy of Sciences, Moscow, Russia
e-mail: kireenk@ipmnet.ru

ABSTRACT

It is proposed further development of the theory of multi-component friction which consists in presenting a more convenient form for the problems of the dynamics of the earlier models, and offered them new forms of higher order, with a reduced number of coefficients.

In addition, the construction of the combined friction models are carried out under the assumption of the validity not only the classical Coulomb's law in differential form for a small element within the area of the contact, but also its generalized forms.

Integration of the friction net force and torque on the contact area gives the exact dynamically coupled integral model that takes into account the relationship of all the components of friction. The exact integral models are replaced by a new type of approximated models which are the ratio of the linear form to square root of the quadratic form. In the distinguish of the dry friction models based on Pade approximants, these models permit to escape using not smooth functions in the cases when velocities are changed their signs and completely satisfy to the all integral model analytical properties as function kinematics parameters. In the proposed generalization, it is succeeded to construct models, fully preserving all the analytic properties of the integral models without increasing the number of coefficients. Moreover, these models permit to escape using not smooth functions in the cases when velocities are changed their signs.