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MODELING FRICTION AND WEAR

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ABSTRACT

Computational modeling of friction and wear presents significant challenges due to the presence of multiple sources of nonlinearity, including geometry, material, and contact nonlinearity. Moreover, rough surfaces in contact exhibit roughness at multiple length scales, ranging from the atomic level to engineering components. These challenges are further complicated by the occurrence of multiple mechanical phenomena, such as adhesion, plasticity, and fracture, which display scale dependency.

To address these challenges, this invited session aims to foster interdisciplinary collaboration among researchers in computational mechanics, solid mechanics, and data science. The goal is to develop numerical methods and models that can capture the material surface and bulk phenomena required for a better understanding of the mechanics of friction and wear at different length scales. The focus will be on the latest numerical developments for modeling friction and wear-related phenomena.

Topics of interest include, but are not limited to, the following areas:

- Modeling elastic and inelastic deformation of rough surfaces in contact
- Modeling surface/bulk damage and crack propagation during sliding contact
- Modeling and simulations of adhesive contact, friction, and wear
- Development of new continuum and discrete numerical techniques for contact mechanics
- Modeling friction and wear through a data science approach such as machine learning