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Recent Progress in Contact Mechanics Methods for Solids with Surface Roughness Using Green's Function Molecular Dynamics

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Abstract. In spite of importance of tribology of solids with surface roughness, there is no synthesized theory covering adhesion yet. One of the methods to describe adhesion in tribological systems is the Green's Function Molecular Dynamics (GFMD). This work aims at reviewing the most recent GFMD techniques and applications of GFMD in contact mechanics. There are different attributes of this method that are important for its realization: model to describe surface roughness, model to describe interfacial forces, constitutive model to describe the solid deformation and algorithm to minimize surface potential energy. We organize this review using the following set of parameters: degrees of freedom of the system modelled, substrate geometry, loading control, material properties, surface topography, interfacial interaction models.

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