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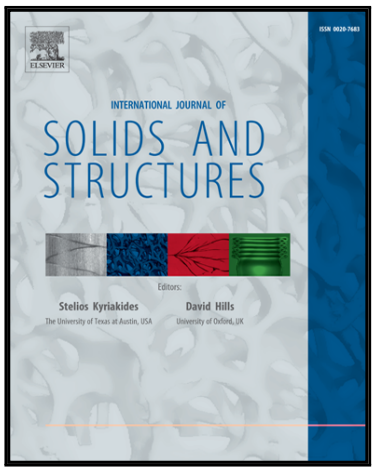


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# Statistical contact model of rough surfaces: the role of surface tension

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**Abstract:** The sizes of most asperities on actual rough surfaces range from nanometers to microns. Recent investigations reveal that surface tension plays an important role in micro-/nano-sized contact. Therefore, in this paper, we address the influence of surface tension on the elastic contact of rough surfaces. Nayak's model is employed to describe rough surface with stochastic distribution of both heights and curvatures. As a fundament, we present the general relations of contact area and load as the function of indent depth for a single micro-/nano-sized asperity by accounting for surface tension. Based on the refined relations, we derive the general relations concerned in the contact of rough surfaces. Compared with the conventional multi-asperity contact models based on the Hertzian contact theory, the existence of surface tension decreases the real contact area and requires higher load to generate a given indent depth. It is found that the area of intimate contact is still approximately proportional to the external load, but the proportionality depends on the surface

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