

微机械弹性纳米接触问题的建模与计算

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摘要 针对Bradley方程和刚性纳米接触模型在处理微机械纳米接触问题中的不足, 基于Lennard-Jones势能定律将组成两接触球体的原子之间的粘着力等效为两球体表面所受分布作用力, 并根据经典弹性理论建立了一种新型的两球体弹性纳米接触模型. 该模型可以同时得到两球面轮廓随间距的变形过程及两球体间的粘着力和表面变形量随间距的变化规律, 并且与现有的由原子力显微镜扫描实验所得到的结论相一致.

关键词 [微机械系统](#) [粘着](#) [纳米接触](#) [纳米摩擦](#)

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Elastic nanocontact model of micro-mechanical systems

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Abstract

Based on the Lennard-Jones potential, the adhesive forces among the atoms of two spheres are considered as the distributing load acting on the surfaces of the two spheres. And according to the classically elastic theory, a novel model of elastic nanocontact of two spheres is established to solve the contact problems emerging in micro-mechanical systems. The model is capable of obtaining the variations with the distance of the adhesive force, the deformations and the contours of the two spheres at the same time. The results from the model established are consistent with the conclusions drawn from the scanning experiments available of atomic force microscopy, which confirms the validity of the model in investigating the nanocontact problems in micro-mechanical systems

Key words [micro-mechanical systems](#) [adhesion](#) [nanocontact](#) [nanotribology](#)

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