

论文

## 任意轴对称弹性体吸附接触的广义Maugis模型

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**摘要** 通过线性叠加Sneddon方法和Lowengrub-Sneddon方法分别给出的解, 得到了一个弹性半空间轴对称混合边值问题的一般解, 进而研究了两个一般轴对称弹性体的正向无摩擦吸附接触问题. 考虑任意有效的表面形状(要求中心部分首先进入接触)和任意的表面吸附作用, 推广得到了广义Maugis模型. 该模型是一个半解析的模型, 它可以分解成表面形状和表面吸附作用的分别独立影响的两部分, 以及一个关联变形和吸附作用的式子. 利用Dugdale模型近似表面吸附作用, 得到了具有任意有效的表面形状的广义M-D模型. 它在强吸附或软材料条件下的极限形式是广义JKR模型, 而在弱吸附或硬材料下的另一个极限形式是广义DMT模型.

**关键词** [吸附](#) [接触](#) [广义M-D模型](#) [广义JKR模型](#) [广义DMT模型](#)

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## A generalized maugis model for adhesive contact of arbitrary axisymmetric elastic objects

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### Abstract

Based on a linear combination of the solutions derived from the Sneddon method and the Lowengrub-Sneddon method, a general solution of the axisymmetric problem is obtained for the elastic half-space with mixed boundary conditions. And then, the frictionless and adhesive contact problem between two general axisymmetric elastic objects is studied. For an arbitrary effective surface profile, i.e., the initial contact occurs at the central part, and an arbitrary surface adhesive interaction, a generalized Maugis model is derived and it can be divided into two parts corresponding to the contributions of the surface profile and the surface adhesive interaction, respectively, and a coupling relation between the deformation and the adhesive interaction. Based on the Dugdale model for the surface adhesive interaction, a generalized M-D model is derived for an arbitrary effective surface profile. Two extremes are found for this model. For a short-range strong interaction or compliant material, its limiting form is corresponding to the generalized JKR model. And for a long-range weak interaction or stiff material, another limiting form is corresponding to a generalized DMT model.

**Key words** [adhesion](#) [contact](#) [generalized M-D model](#) [generalized JKR model](#) [generalized DMT model](#)

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