结合面法向接触刚度分形模型建立与仿真 Fractal Model and Simulation of Normal Contact Stiffness of Joint Interfaces and Its Simulation

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摘 要： 基于接触分形理论和微接触大小分布函数，建立了计及微接触大小分布的域扩展因子影响的结合面法向接触刚度的分形模型，并通过对所建模型的数字仿真，直观地揭示了结合面法向接触刚度与结合面诸参数之间的非线性关系，探讨了这些相关参数对法向接触刚度的影响规律。研究仿真结果表明，结合面法向接触刚度随着结合面法向载荷的增大而增大，随结合面分形特征长度尺度参数的增大而减小，但随结合面分形维数的变化规律比较复杂。

Based on contact fractal theory and micro-contact size distribution function, a fractal model of normal contact stiffness of joint interfaces was proposed, considering the influence of the domain extension factor for micro-contact size distribution. Furthermore, numerical simulation was carried out to obtain the nonlinear relationships between normal contact stiffness and characteristic parameters of joint interfaces. And the effect of these parameters on the normal contact stiffness was also analysed. The results show that the normal contact stiffness of joint interfaces increases with the normal load on joint interface, decreases with the fractal characteristic length scale parameter G, however, complicatedly varies with the fractal dimension D.

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