

An improved maximum tangential stress criterion for one oblique crack under uniaxial compression considering T -stress and crack parameter

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Abstract

The engineering rockmass is often prone to compression, therefore how to establish a fracture criterion to reflect the rockmass compression failure is vital. Take the rockmass with one oblique crack for instance, the mechanical behavior of the oblique crack face closure and friction sliding under uniaxial compression is firstly analyzed, and then the Kolossoff-Muskhelishvili stress function of the rockmass under uniaxial compression is established based on the complex stress functions. Next, the calculation methods of the stress intensity factor (SIF) K and three T -stress components at or near the crack tip considering three kinds of crack parameters (e.g. geometry parameter, friction strength parameter and deformation parameter) are obtained. Thirdly, the improved maximum tangential stress (MTS) criterion is obtained considering T -stress and three kinds of crack parameters. Finally, the relevant experiments done by other researchers are adopted to verify the improved MTS criterion. Meanwhile, the effect of γ , the crack normal stiffness k_n and shear stiffness k_s , and the crack friction coefficient f on the wing-crack initiation angle are discussed with the parametric sensitivity analysis.

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