

目次

裂纹几何特征对压剪复合断裂的影响分析

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摘要 针对岩石类材料中压剪裂纹的复合断裂问题, 理论上一般将其抽象为没有厚度的Griffith线裂纹, 这样就会导致翼裂纹初始起裂角与主裂纹方位角及围压无关的结论。而已开展的压剪裂纹复合断裂试验表明, 翼裂纹起裂角与主裂纹方位角和围压明显相关。首先较系统地讨论原生(或预制)裂纹的几何特征(如厚度、裂纹尖端曲率半径等)及围压对翼裂纹起裂角的影响; 然后结合含预制裂纹大理岩压剪试验进行翼裂纹起裂角的理论预测和试验结果的对比分析。该分析为压剪复合断裂试验提供了一个理论分析框架, 也为进一步研究具有复杂几何形状的裂隙提供了一定的理论基础。

关键词 [断裂力学](#) [复合断裂](#) [翼裂纹起裂角](#) [应力强度因子](#) [岩石类材料](#) [围压](#)

分类号

**INFLUENCE OF GEOMETRIC CHARACTERISTICS OF PRE-EXISTING CRACKS ON MIXED MODE FRACTURES UNDER COMPRESSION-SHEAR LOADING**

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**Abstract**

The mixed mode fractures in quasi-rock materials under compression-shear loading are usually simulated using Griffith cracks with zero thickness. It leads to the result that the initiation angles of wing cracks are independent of the fracture orientation angles and the confining pressure. However, many previous experiments showed this conclusion was not valid necessarily. Therefore, a theoretical and also an experimental analyses are carried out to investigate the influence of geometric characteristic on the initiation angles of wing cracks, e.g. the thickness of pre-existing fractures and the radius of curvature near the fracture tip. The proposed method will provide a theoretical frame for the experimental analysis of mixed mode fractures of samples under compression-shear loading, and also for further stress analysis of the morphologically complex cracks.

**Key words** [fracture mechanics](#) [mixed mode fracture](#) [initiation angle of wing crack](#) [stress intensity factors](#) [quasi-rock materials](#) [confining pressure](#)

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