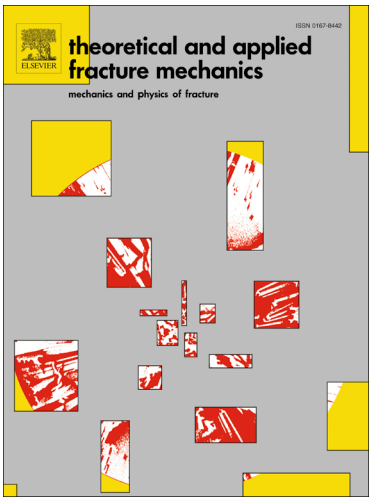

Failure characteristics of intermittent fissures under a compressive-shear test: experimental and numerical analyses

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PII: S0167-8442(17)30329-4
DOI: https://doi.org/10.1016/j.tafmec.2017.11.002
Reference: TAFMEC 1968

To appear in: *Theoretical and Applied Fracture Mechanics*

Received Date: 4 July 2017
Revised Date: 6 November 2017
Accepted Date: 7 November 2017

Please cite this article as: R-h. Cao, P. Cao, H. Lin, G. Ma, Y. Chen, Failure characteristics of intermittent fissures under a compressive-shear test: experimental and numerical analyses, *Theoretical and Applied Fracture Mechanics* (2017), doi: https://doi.org/10.1016/j.tafmec.2017.11.002

Failure characteristics of intermittent fissures under a compressive-shear test: experimental and numerical analyses

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Abstract: Extensive efforts have been made in the understanding of the failure characteristics of brittle materials with fissures, but the topic of crack initiation and coalescence under compressive-shear loading has still not been examined comprehensively. To address this area of research, the failure characteristics of specimens containing intermittent fissures have been studied by rock-like material experiments and particle flow code (PFC2D). Three types of coalescence patterns are observed between intermittent fissures, with most of the coalescence forming through a combination of mixed and shear cracks. Mixed pattern-I mainly occurs in the specimen with inclination angle $\alpha = 0°$, and the overall failure results from mixed crack propagation, although the tensile cracks appear first. For the shear pattern, the central fissure coalesces with the edge-notched fissure through a shear crack and mainly occurs in the specimen when $\alpha = 30°$ and $45°$. Mixed pattern-II appears in the tests with $\alpha > 45°$, and the main failure plane starts from the edge-notched fissure and terminates at the tips of the central fissure. The simulated results agree very well with the experimental results, and the conclusions are very important for ensuring the stability and safety of rock masses with intermittent fissures.

Keywords: Intermittent fissures, Rock-like material, Compressive-shear loading, Failure loads, Coalescence

Nomenclature	
DIC	digital image correlation
UCS_I	uniaxial compressive strength of intact material
E_I	young's modulus of intact material
ν	poisson's ratio of intact material
σ_t	tensile strength of intact material
c	cohesion of intact material
ψ	friction angle of intact material
α	inclination angle