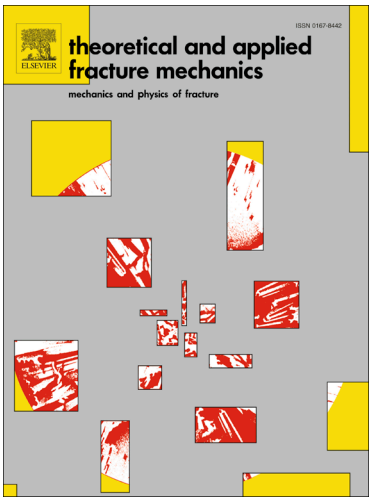

Frequency characteristics of the released stress wave by propagating cracks in brittle materials

Zonglian Wang, Jianguo Ning, Huilan Ren

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Frequency characteristics of the released stress wave by propagating cracks in brittle materials

Zonglian Wang, Jianguo Ning, Huilan Ren [a)]

State Key Laboratory of Explosion Science and Technology, Beijing Institute of Technology, Beijing 100081, China

Abstract: Stress waves are generated when stored energy is suddenly released from localized sources within brittle materials during the process of crack initiation and propagation. The frequency of the stress wave is related to the velocity of energy release. In this paper, the relationship between the frequency of the released stress wave and the effective elastic modulus of the medium in the crack-tip region is first investigated from the perspective of energy. Then, the relationship between the effective elastic modulus of the medium in the crack-tip region and the size of the crack source is studied. The analytical results show that the frequency of the released stress wave is inversely related to the crack size. The detected stress waves in the form of acoustic emission (AE) signals can give insights into the process of energy dissipation and emission in response to the initiation and propagation of crack. AE study of the fracture process of concrete materials under uniaxial compressive loading was performed to demonstrate the theoretical result. The inverse relationship between the frequency of the stress wave released by the propagating crack and the crack size

[a)] **Author to whom correspondence should be addressed. Electronic mail:** huilanren@bit.edu.cn.