



Acoustic Emission Parameters of Three Gorges Sandstone during Shear Failure

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Abstract

In this paper, an experimental investigation of sandstone samples from the Three Gorges during shear failure was conducted using acoustic emission (AE) and direct shear tests. The AE count rate, cumulative AE count, AE energy, and amplitude of the sandstone samples were determined. Then, the relationships among the AE signals and shearing behaviors of the samples were analyzed in order to detect micro-crack initiation and propagation and reflect shear failure. The results indicated that both the shear strength and displacement exhibited a logarithmic relationship with the displacement rate at peak levels of stress. In addition, the various characteristics of the AE signals were apparent in various situations. The AE signals corresponded with the shear stress under different displacement rates. As the displacement rate increased, the amount of accumulative damage to each specimen decreased, while the AE energy peaked earlier and more significantly. The cumulative AE count primarily increased during the post-peak period. Furthermore, the AE count rate and amplitude exhibited two peaks during the peak shear stress

period due to crack coalescence and rock bridge breakage. These isolated cracks later formed larger fractures and eventually caused ruptures.

Key words: sandstone, shear failure, acoustic emission, displacement rate.