



Acoustic Emission, b-values and Foliation Plane Anisotropy

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The b-value and D-value are two parameters related to size and distance distribution of earthquakes. There are many different factors affecting b-value such as stress state, thermal gradients, focal mechanism and heterogeneity. For example, the literature shows that the b-value changes systematically with respect to the focal mechanism. In laboratory experiments, foliation planes introduce a weakness in samples and can be considered as a potential for rupture or pre-existing faults, so they may exhibit similar relationships. The D-value defines the degree of clustering of earthquakes and would be expected to have a defined relationship with respect to the anisotropy. Using a unique facility in the Rock Fracture Dynamics laboratory at the University of Toronto, three sets of polyaxial experiments have been performed on cubic samples with foliation planes systematically oriented at different angles to the principal stress direction. During these tests, samples were loaded under controlled true-triaxial stress conditions until they failed or had severe damage and acoustic emission events were recorded using 18 sensors around the samples. The paper describes how the combination of stress state and foliation planes affects the b-value and D-value under laboratory conditions.