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Estimation of crack density and permeability in damaged rocks based on crack observation

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Microcracking (crack growth), along with accumulation of inelastic strain, takes place in crystalline rock such as granite when it is subjected to differential stress. As a result, growing cracks become interconnected, completely altering permeability. Therefore, coupling between crack growth and permeability change must be determined to fully understand the hydro-mechanical response of rocks subjected to non-hydrostatic stress.

In the field and thin section, we can observe only two-dimensional cracks. In order to estimate three-dimensional permeability, we have to estimate three-dimensional crack geometry using limited information such as core, outcrop and thin section. We try to estimate permeability in granitic rocks, which damaged by tri-axial compression experiment under confining pressure up to 140MPa, based on crack tensor concept and stereology-based fabric analysis.