

Development of Automatic Multistage Triaxial Test to Characterize Failure Criteria in Siltstone Rocks – Applied to the Montney Formation, BC, Canada

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Summary (

Characterizing failure curve is one of the most important tasks in any type of rock mechanics engineering practice (e.g., slope stability, block caving, petroleum geomechanics). The most common method to obtain this failure curve is conducting conventional triaxial compression test on at least three specimens under varied confining pressures. However, there is almost always scarcity of samples (generally in deep formation such as Montney). The lack of sample issue manifests the primary advantage of multistage triaxial compression test, in which, only one sample suffices to obtain failure curve. The most challenging task in conducting multistage triaxial test is determination of the failure point in each stage. Even though well-trained highly experienced technician runs the test, the credibility of the results is threatened by subjectivity and inconsistency in determining the failure points.

To measure failure criteria in Montney Formation, a series of multistage triaxial compression tests were conducted on siltstone sample with similar mechanical and physical properties as Montney Formation. The objective was to develop measurement setup and control mode with servo-control triaxial compression apparatus to terminate each loading stage in multistage triaxial test as close to the peak strength, but still does not cause any damage to the sample.