

08.15: Numerical implementation of mudrock stress-level dependency

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ABSTRACT

We present the first numerical implementation of mudrock stress-level dependency, SR3KH. This is an enhanced version of the Elfen SR3 constitutive model and it is based on experimental measurements on RGoM-EI material. It accounts for material anisotropy (yield-surface rotation) and degradation of frictional resistance. We use a single element triaxial compression numerical test to illustrate that the slope of the failure line decreases with stress level (Figure 1) and mudrocks fail at a lower ratio of shear to mean effective stress. We also show that the undrained shear stress path generates higher shear induced pore pressures than the original model. Furthermore, we test a uniaxial column that compresses under its own weight. We find that accounting for stress-level dependency predicts an effective stress ratio that increases with depth, and consequently a least principal stress that also increases with depth and converges to the value of overburden (Figure 2). In addition, stress-level dependency predicts lower porosity than the original implementation for the same depth, because of higher mean effective stress.

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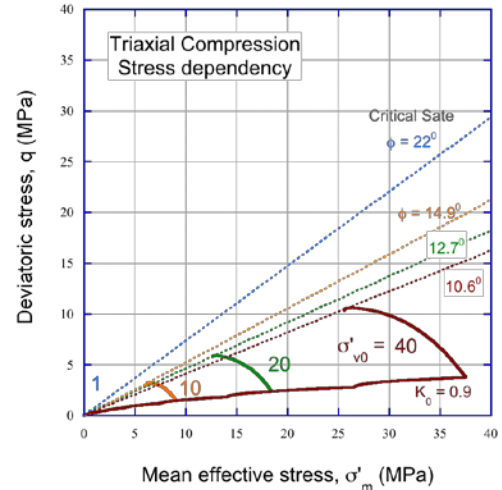


Figure 1: Stress-level dependency predicts that the slope of the failure line decreases with stress level.

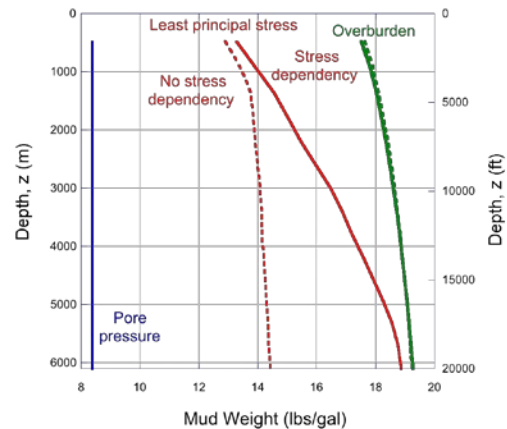


Figure 2: Accounting for stress-level dependency predicts that least principal stress increases with depth and converges to the value of overburden.

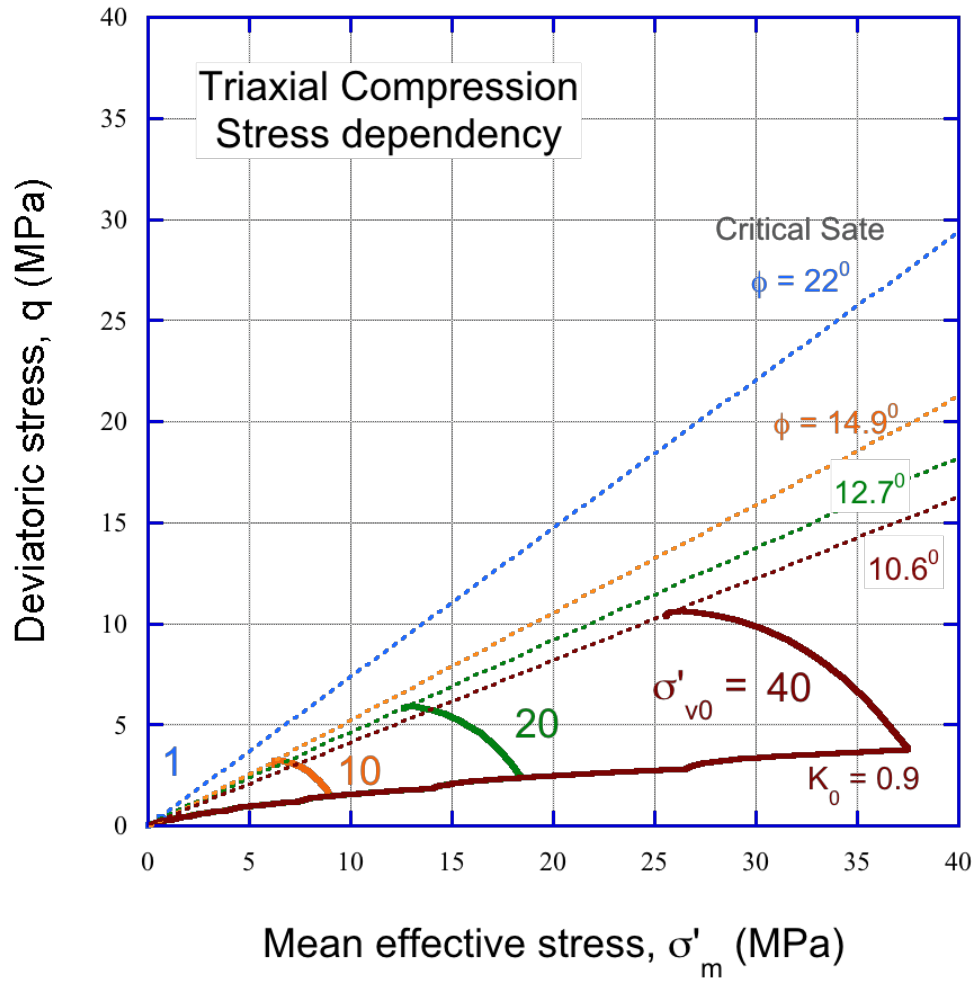


Figure 1: Stress-level dependency predicts that the slope of the failure line decreases with stress level.

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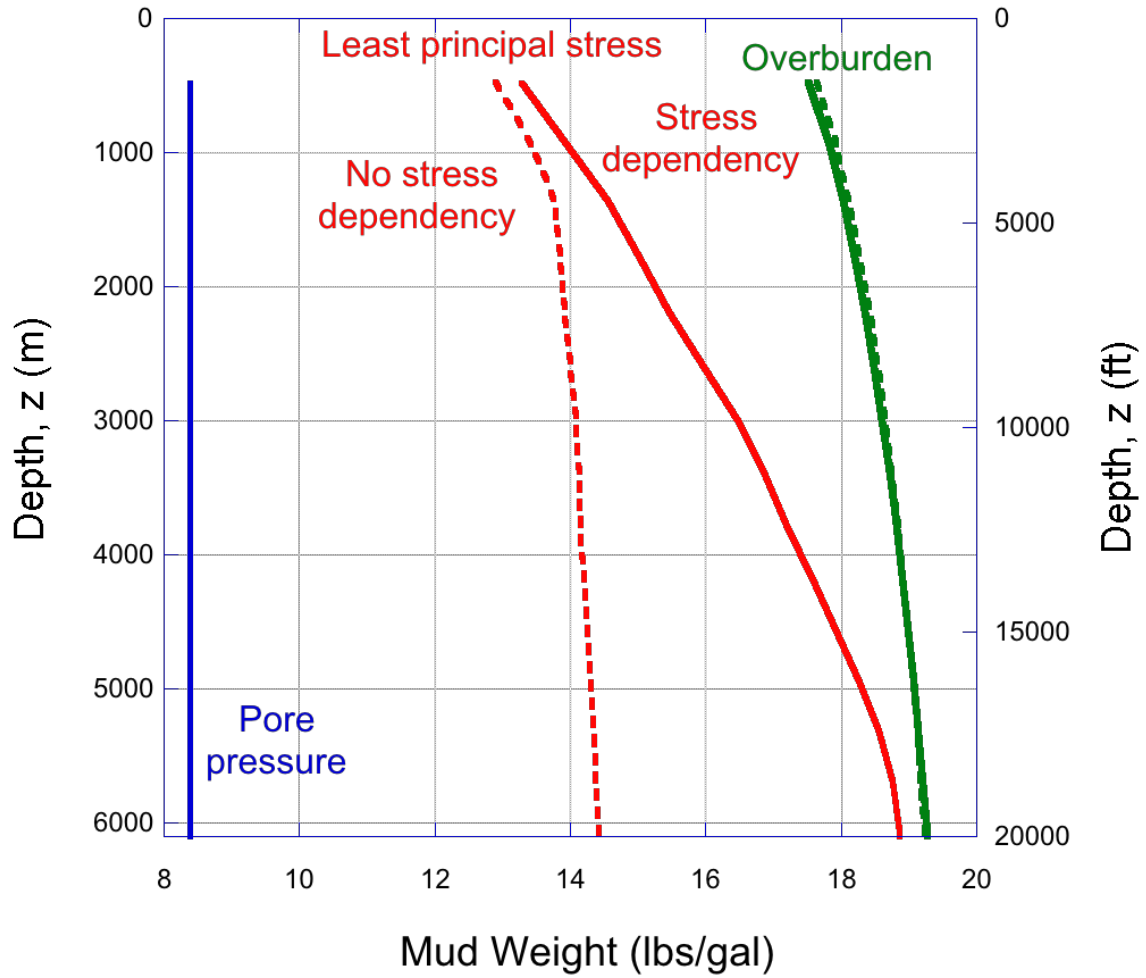


Figure 2: Accounting for stress-level dependency predicts that least principal stress increases with depth and converges to the value of overburden.

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