

Stress dependence of the yield surface on Gulf of Mexico Mudstone

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ABSTRACT

The yield surface is an important parameter for characterizing soil behavior and is incorporated in most material models of mudrocks. It is the contour that separates the stress state at which the mudrock is behaving elastically from where it is behaving plastically. Resedimented mudrock specimens are K_0 consolidated to 1 and 10 MPa and then unloaded to a hydrostatic stress state (Path 1-2, Fig. 1). Drained triaxial tests sheared along different stress paths are used to probe the in different directions and characterize the shape of the yield surface. The results are compared to model formulations; such as MIT-E3 and MCC, and to previous research done at 1 and 10 MPa. The yield surface rotates and contracts as the stress level increases. Comparing the drained and undrained shear behavior indicates that the undrained stress path provides a good approximation for the shape of the yield surface in compression but not in extension. Samples undergo strain hardening beyond the yield point (Fig. 2) and before failure.

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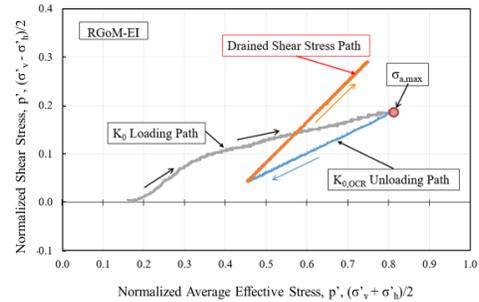


Fig 1: Probing with drained triaxial tests to identify the yield surface.

1. Initially K_0 Consolidate specimen to a known stress level.
2. Unload the specimen to a hydrostatic state of stress.
3. Probe out in different directions to characterize the yield surface

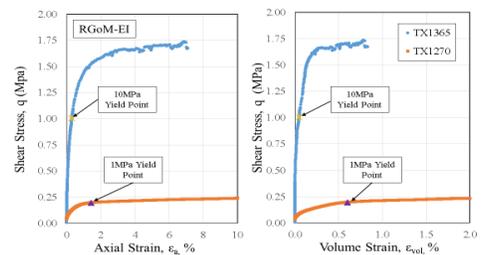


Fig 2: Comparison of drained stress-strain curves for RGoM-EI Clay following K_0 compression at 1 and 10 MPa.

The specimens undergo strain hardening past yield points.

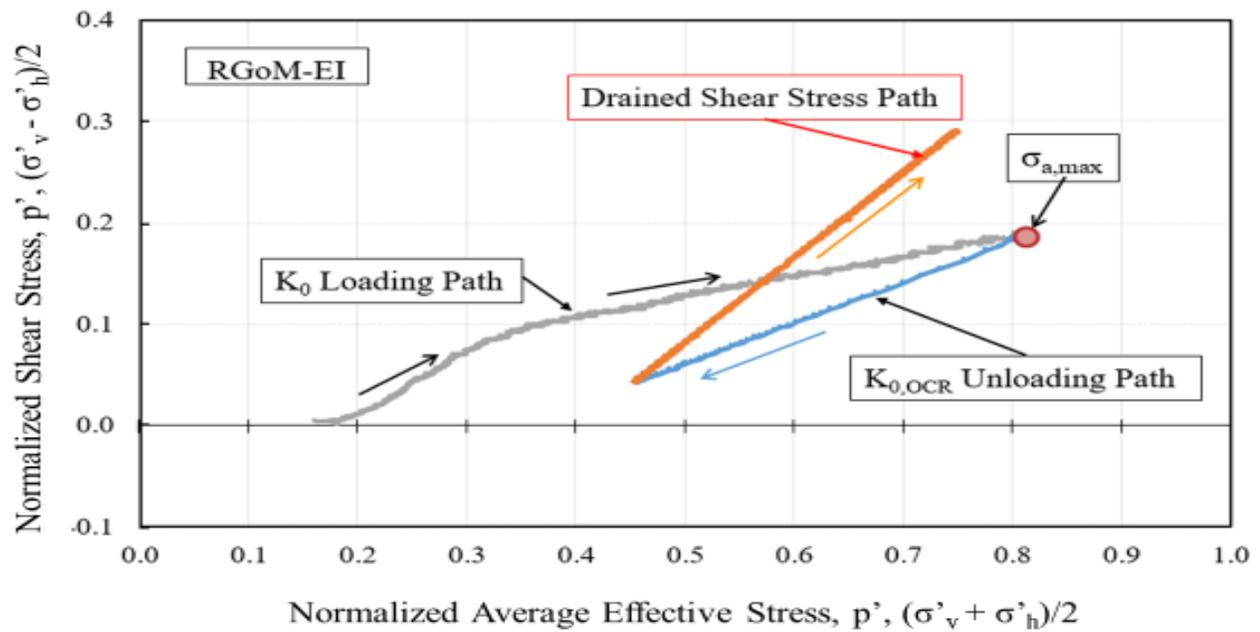


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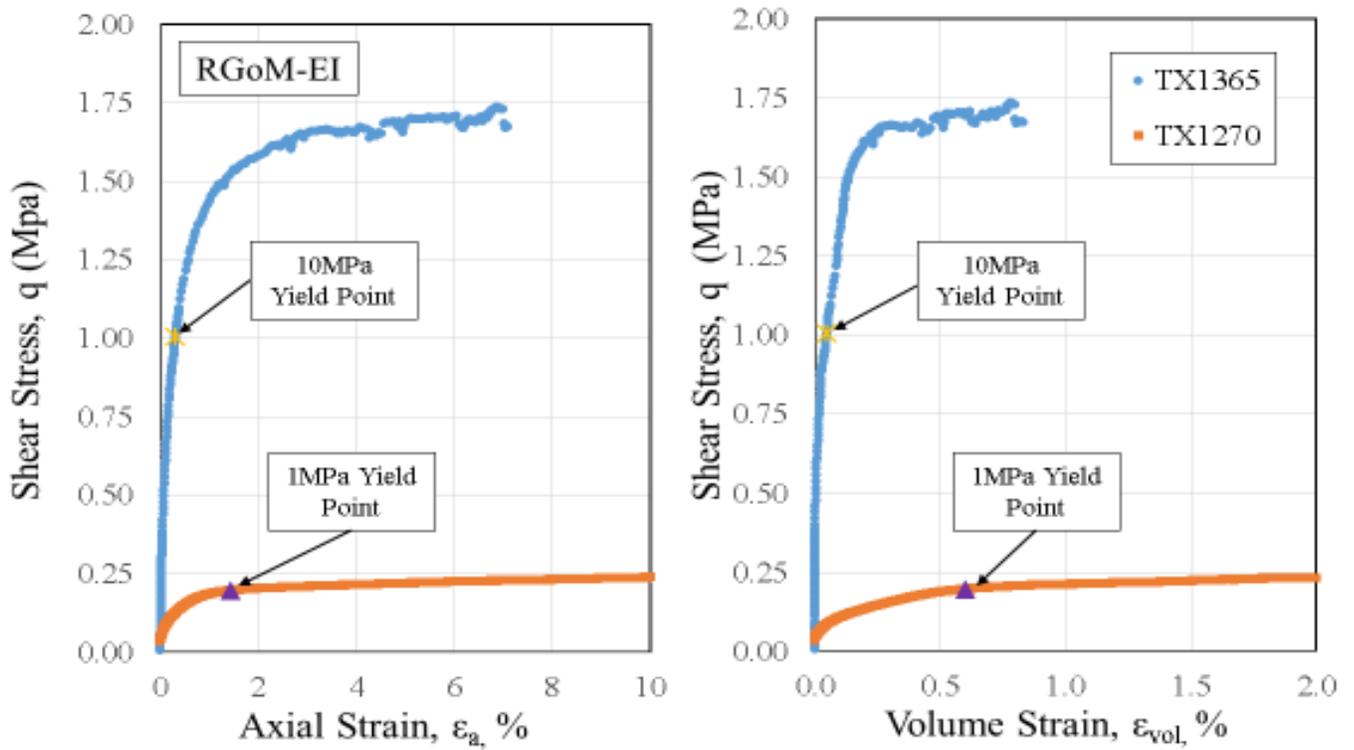


Fig 2: Comparison of drained stress-strain curves for RGoM-EI Clay following K_0 compression at 1 and 10MPa. The results suggest strain hardening past yield points.

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