13.12: Factors that Affect K_0 Measured in Triaxial Compression Tests

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ABSTRACT

Triaxial testing is used to determine the at-rest lateral stress ratio, K0. This research evaluates the current triaxial technology to understand the potential sources of error in the measured Ko values and make the necessary modifications for future testing. The study performed a reanalysis of past testing on RBBC and RGoM-EI material. Not correcting for apparatus compressibility in the control software leads to a systematic radial contraction of specimens and slight overestimation of the K0 values. For smectite rich mudrock (RGoM-EI), the standard rate of straining causes excessive pore pressures during consolidation at high stress levels. This is suspected to cause an overestimation of the K0 values with the error increasing with stress levels. Modifications to the equipment were developed to improve dissipation of excess pore pressures.

CLICK ON IMAGE FOR LARGER VIEW

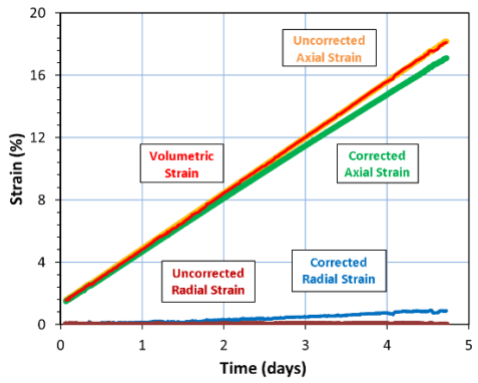


Fig 1: Vertical effective stress vs strain during consolidation stage of CK_0UC triaxial test up to 10 MPa, showing reduction in axial strain corrected for apparatus compressibility and the subsequent calculated radial contraction.

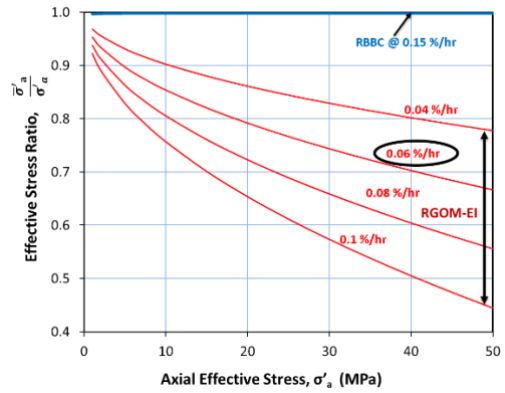
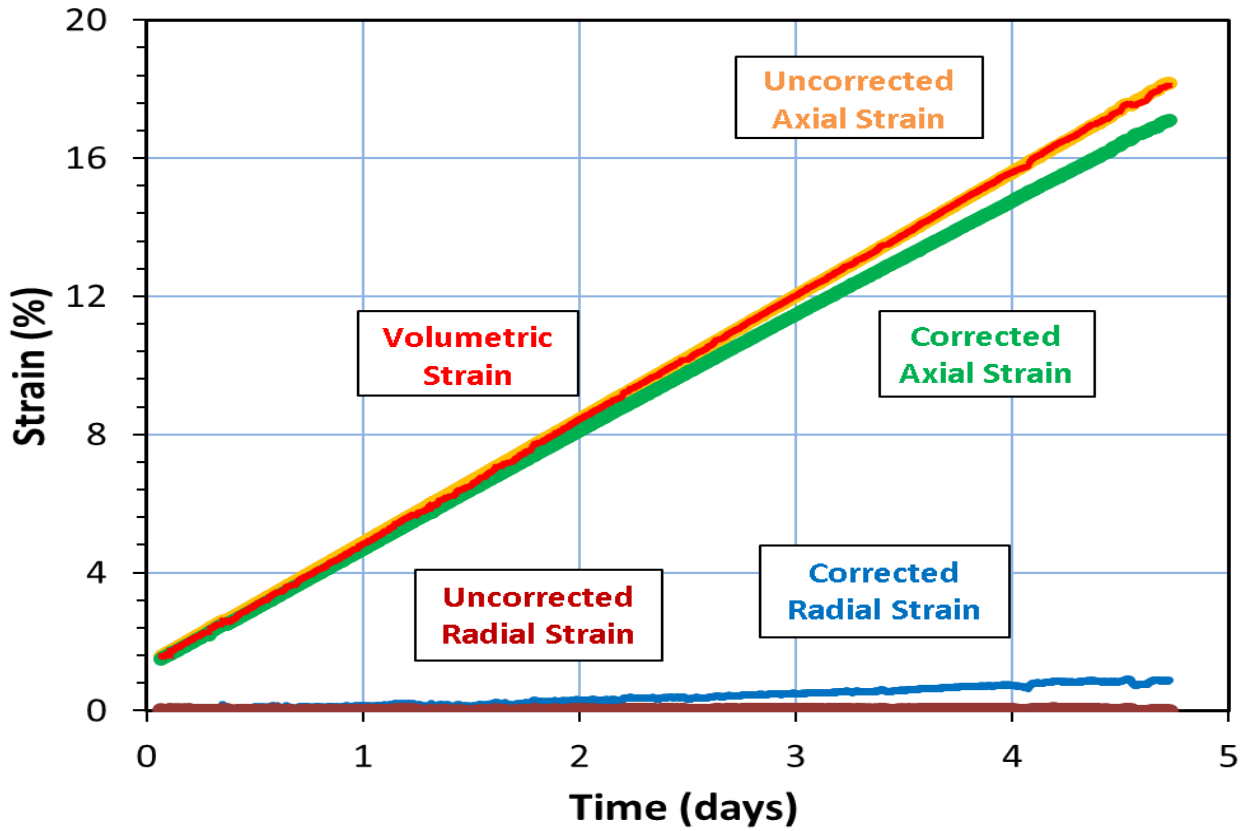


Fig 2: Effective stress ratio vs axial effective stress. For RBBC, there is no significant generation of excess pore pressures. For RGoM-EI, there is a significant generation of excess pore pressure. This is driven by low permeability of RGoM-EI. Strain rate has a significant effect on these pore pressures.



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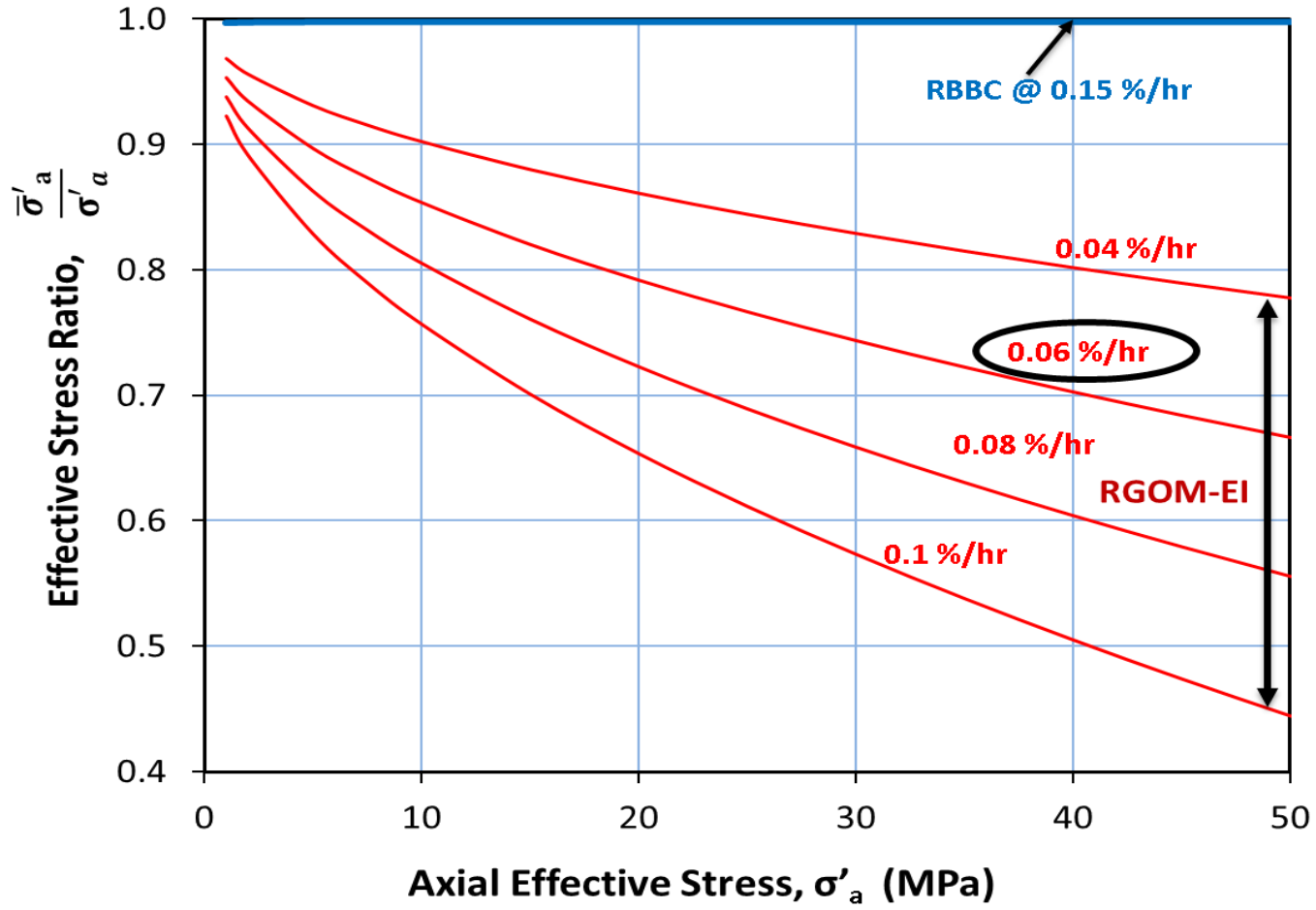

Fig. 2: Left: Excess pore pressure due to 0.08%/hr strain rate generated during consolidation phase of CK_0UC triaxial test on RGOM-EI. Right: Lateral Stress Ratio, K, vs vertical effective stress for CK_0UC triaxial test on RGOM-EI.

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