11.08: Changes to the Gulf of Mexico Yield Surface Under Generalised Loading

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ABSTRACT

This research aims to investigate how the shape of the yield surface evolves with non-K_0 loading and with varying stress level, especially at higher stress levels up to 100 MPa. Understanding how the yield surface changes under different stress paths is key to understanding the behaviour of sediments under complex geologic conditions and is vital to accurately predicting pore pressures in marine sediments.

The undrained constant volume shearing stress path will be used to approximate the shape of the yield surface. This removes the uncertainty associated with defining the yield point from drained stress paths. Preliminary data from tests run at low stress on Resedimented Boston Blue clay (RBBC – Figure 1) illustrate the dependence of the yield surface on the loading path.

Tests are being performed on Resedimented Gulf of Mexico Eugene Island (RGoM-EI) clay. Specimens are consolidated to 40MPa before being undrained sheared using the high pressure triaxial cell (Figure 2). Tests will be run both in compression and extension in order to fully define the yield envelope above and below the hydrostatic axis.

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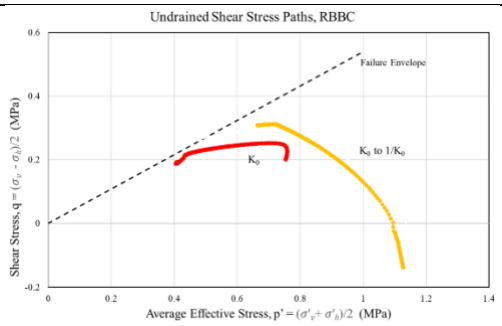

Fig 1: Undrained shear effective stress paths for RBBC clay with OCR = 1 at low stress, illustrating the dependence of the yield surface on the loading path.

Fig 2: High pressure triaxial cell

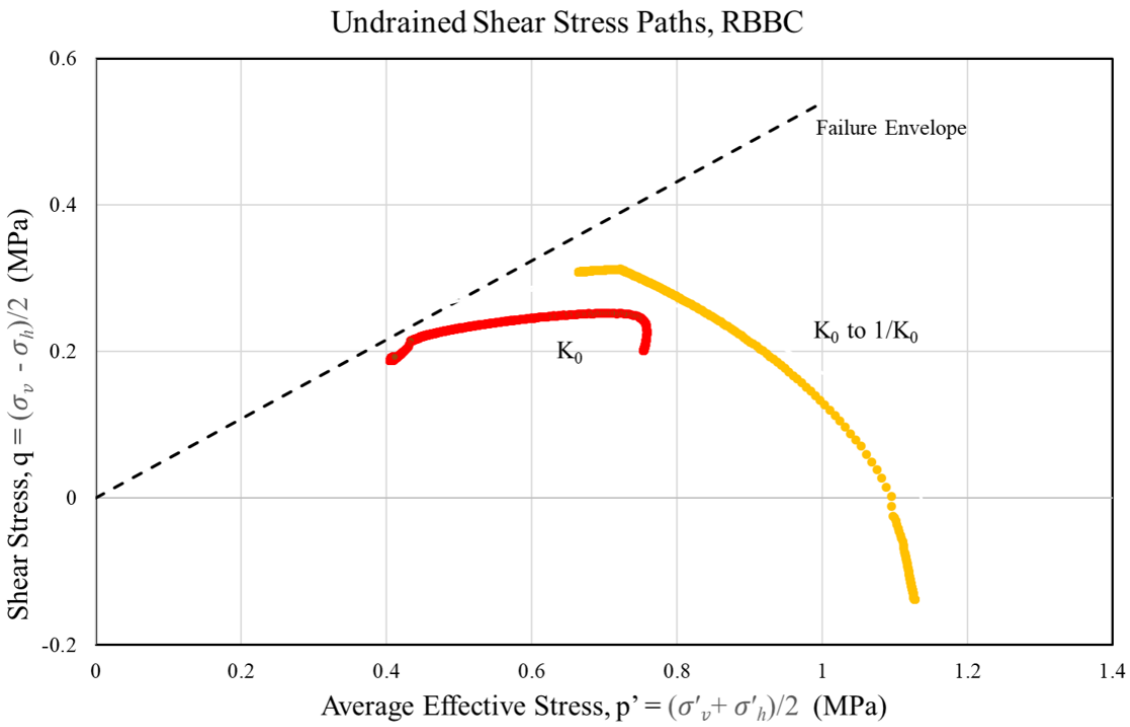

Fig. 1: Undrained shear effective stress paths for RBBC clay with OCR = 1 at low stress, illustrating the dependence of the yield surface on the loading path

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Fig. 2: High pressure triaxial cell - capable of withstanding up to 100 MPa cell pressure

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