07.18: CRS-Measured Permeability Anisotropy in Sheared and Un-sheared Mudrocks

Taylor Nordquist, MIT

ABSTRACT

Particle orientation within a mudrock, which causes permeability anisotropy, can be caused by vertical compression and mudrock shearing. To expound on our database characterizing permeability anisotropy of uniform resedimented mudrocks due to vertical compression, we have run several tests to begin to explore how shearing affects permeability anisotropy. We have horizontally sheared 4 pairs of resedimented mudrock samples in a direct simple shear (DSS) device (see Figure 1), then cored specimens from the sheared samples for vertical and radial permeability measurement in constant-rate-of-strain (CRS) consolidometers.

Horizontal shearing to 25-40% under 0.1-1 MPa vertical effective stress shows no significant effect on permeability anisotropy for resedimented Boston Blue Clay (RBBC) and resedimented Gulf of Mexico – Eugene Island (RGoM-EI) mudrocks (see Figure 2). Virgin compression behavior of both these mudrocks also shows no significant change.

CLICK ON IMAGE FOR LARGER VIEW

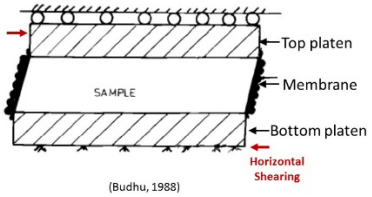


Fig 1: Resedimented mudrock samples are sheared horizontally in an undrained (constant volume) condition using a direct simple shear (DSS) device. Test specimens are then cored from the sheared samples for vertically and radially-draining CRS permeability testing.

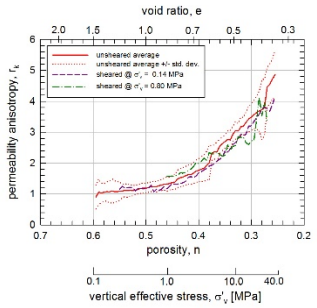
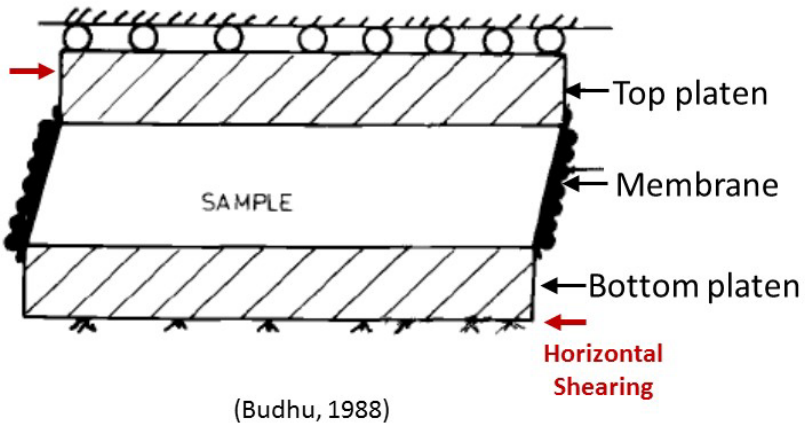


Fig 2: The permeability anisotropy of RGoM-EI, measured using radially and vertically-draining CRS testing, is unchanged by horizontal shearing to 25-40% under 0.1-1 MPa vertical effective stress, using a direct simple shear (DSS) device. RBBC shows similar results.



(Budhu, 1988)

Fig. 1: Resedimented mudrock samples are sheared horizontally in an undrained (constant volume) condition using a direct simple shear (DSS) device. Test specimens are then cored from the sheared samples for vertically and radially-draining CRS permeability testing.

Back

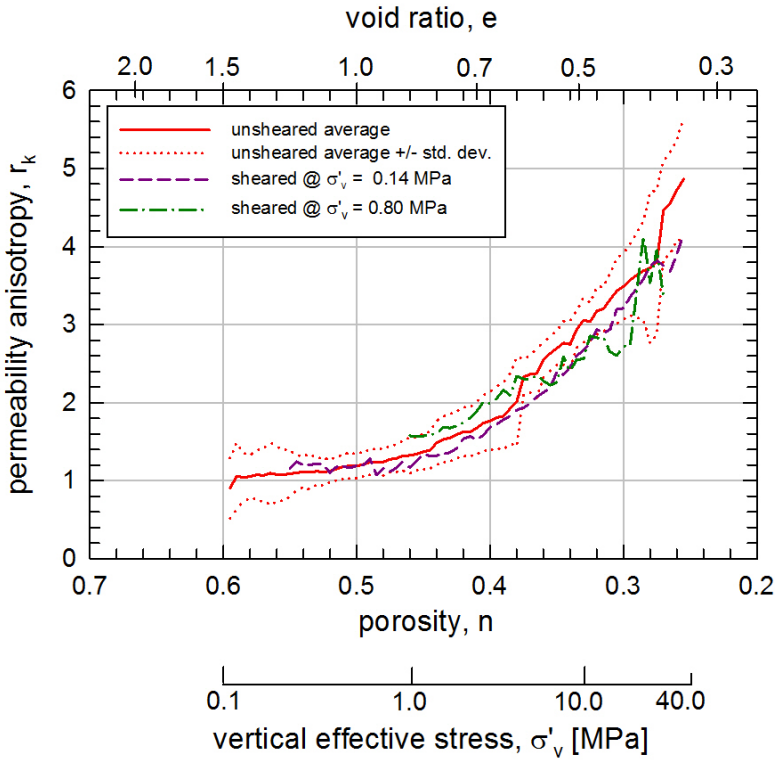


Fig. 2: The permeability anisotropy of RGoM-EI, measured using radially and vertically-draining CRS testing, is unchanged by horizontal shearing to 25-40% under 0.1-1 MPa vertical effective stress, using a direct simple shear (DSS) device. RBBC showed similar results.

Back