Resistivity in Mudrocks

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ABSTRACT

We have developed the ability to measure the resistivity of fully saturated mudrocks up to stresses of 40 MPa in the triaxial cell. The resistivity anisotropy of cubic specimens is measured using modified end adapters fitted with four electrodes.

We show that for Resedimented Boston Blue Clay (RBBC) at a pore fluid salinity ~ 16 g/L, the resistivity varies from ~ 1 - 4 over a porosity range of 0.47 to 0.33 (Figure 1). The formation factor varies from ~ 2 to 10 over this porosity range.

Conductivity anisotropy (σ_h/σ_v), the inverse of the resistivity anisotropy, increases from 1 - 2 and agrees well with permeability anisotropy measurements. Conductivity anisotropy may be a useful measure, eliminating variations caused by pore fluid salinity and other isotropic soil properties.

CLICK ON IMAGE FOR LARGER VIEW

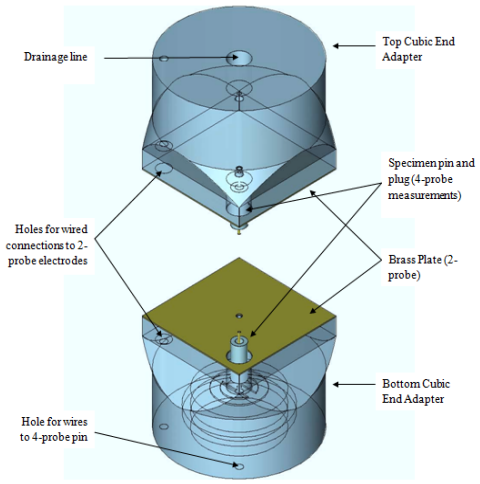


Fig. 1: We have developed special cubic end adapters with electrodes to allow measurement of the resistivity of cubic specimens under full saturation and up to stresses of 40 MPa in the triaxial cell. Two plate probes apply a differential voltage to the specimen; resistivity is computed using the measured voltage drop between two pin probes extending into the specimen.

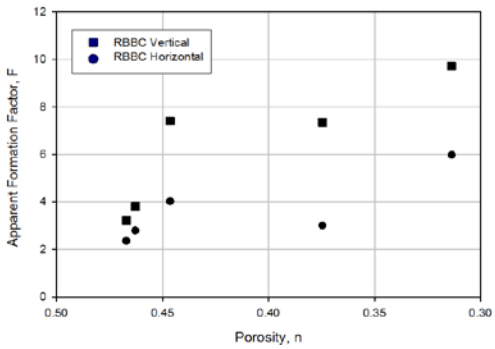
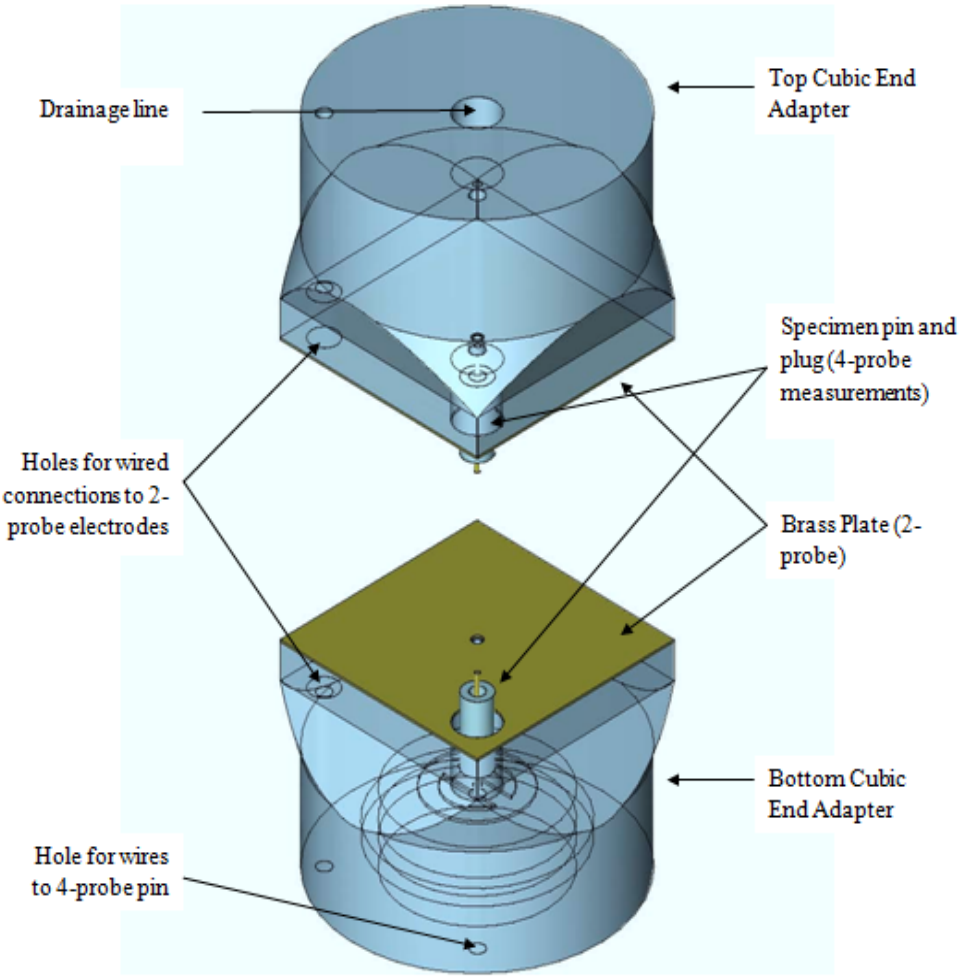


Fig. 2: Vertical (squares) and Horizontal (circles) formation factor for Resedimented Boston Blue Clay at 16 g/L pore fluid salinity. Resistivity and formation factor increase with decreasing porosity and increasing axial stress. The formation factor varies from ~ 2 - 10 over a porosity

	range of 0.47 to 0.33.



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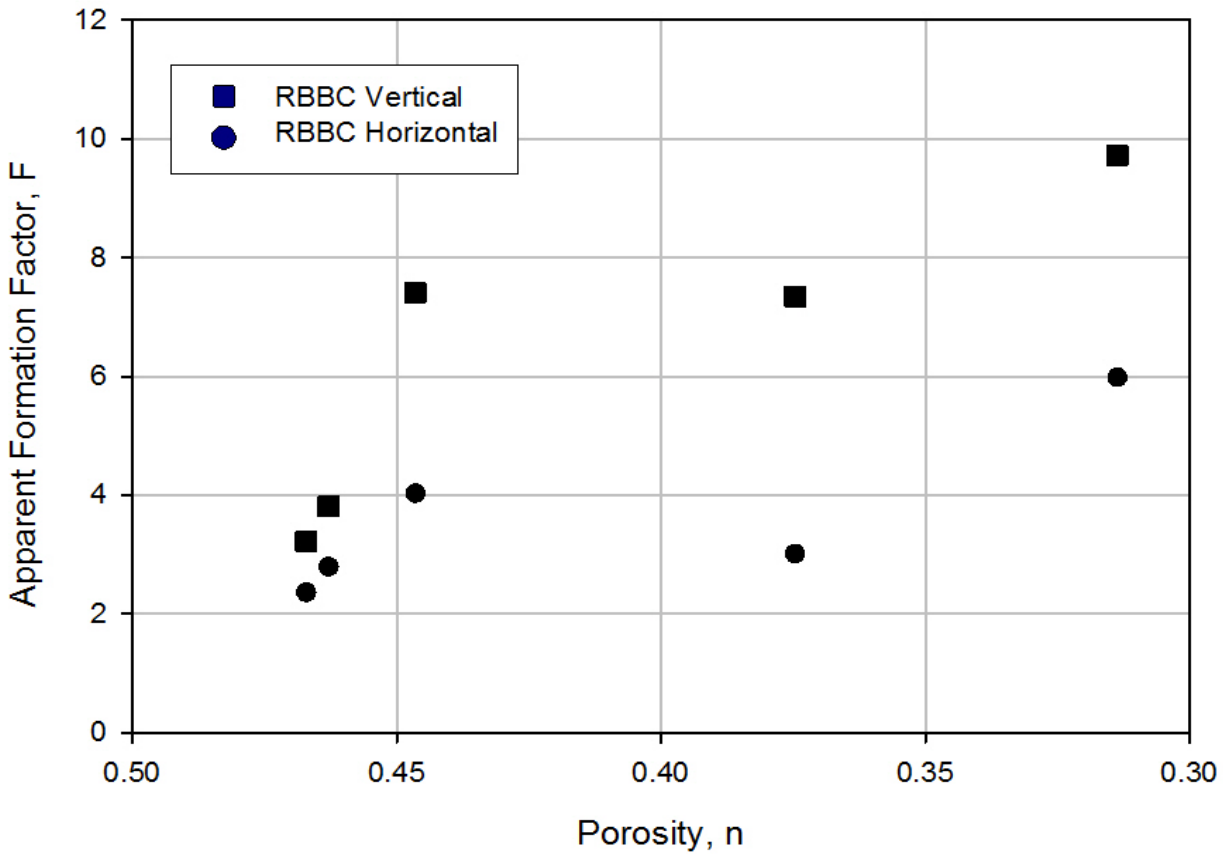

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