

Velocity Anisotropy in Mudrocks

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ABSTRACT

Measurements of shear wave propagation were performed on Resedimented Boston Blue Clay (RBBC) and Resedimented Gulf of Mexico (RGOM) in a modified cubic triaxial apparatus using bender elements, with the results indicating a stress-dependent trend. The specimens were taken to a preconsolidation stress of 100kPa and subsequently uniaxially consolidated. During the consolidation process both horizontal (V_{SHH}) and vertical (V_{SV}) shear velocity measurements were concurrently obtained. The vertical shear velocity (V_{SV}) was plotted against density in a crossplot as seen in **Fig.1**. The values for RGOM and RBBC were shown to converge as the consolidation proceeded. When the anisotropy was measured, it was seen that the anisotropy of RBBC decreased as a function of applied mean effective stress (**Fig. 2**). The RGOM anisotropy measurements, however, were considerably lower and seemed to be insensitive to stress application, nearly maintaining unity throughout the loading process. The anisotropy results can be used in many applications, including improvements in basin modeling as well as subsurface stress predictions.

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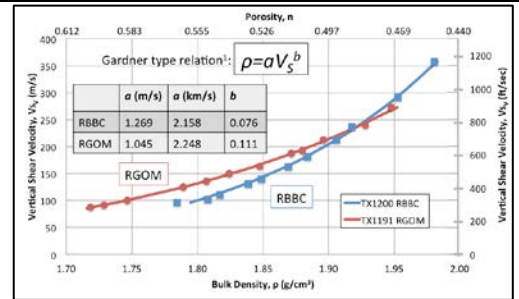


Fig. 1: Plotting the RBBC and RGOM in velocity-density cross-space, it becomes evident that the two materials intersect. Before the intersection, RGOM has higher velocity than RBBC at the same given density. The RGOM data points to the left are also exhibiting a higher stress than RBBC for the same given porosity.

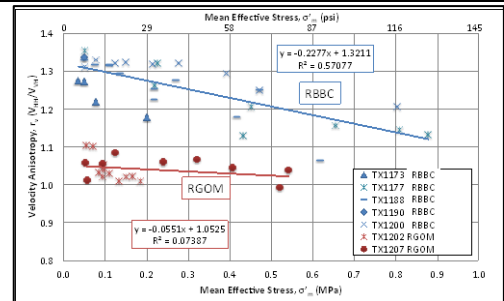


Fig. 2: The anisotropy measurements conducted on RBBC using bender elements shows that there is a decreasing trend in anisotropy as the mean effective stress increases. The RGOM anisotropy results indicate high plasticity clays have a more isotropic velocity behavior.

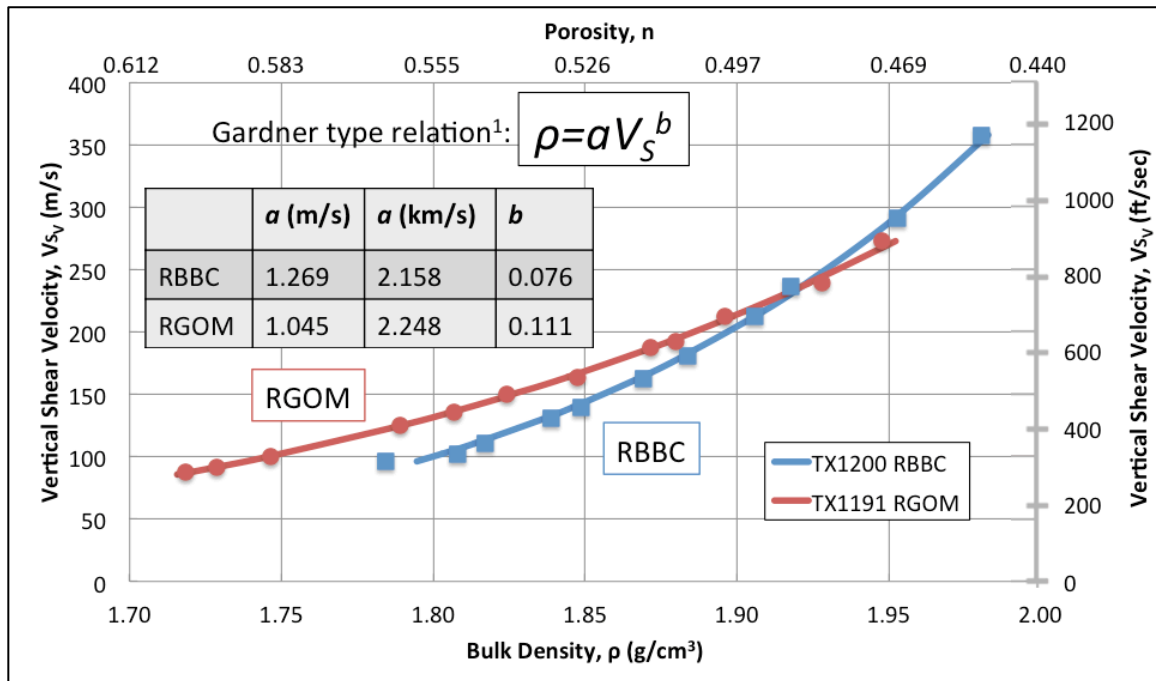


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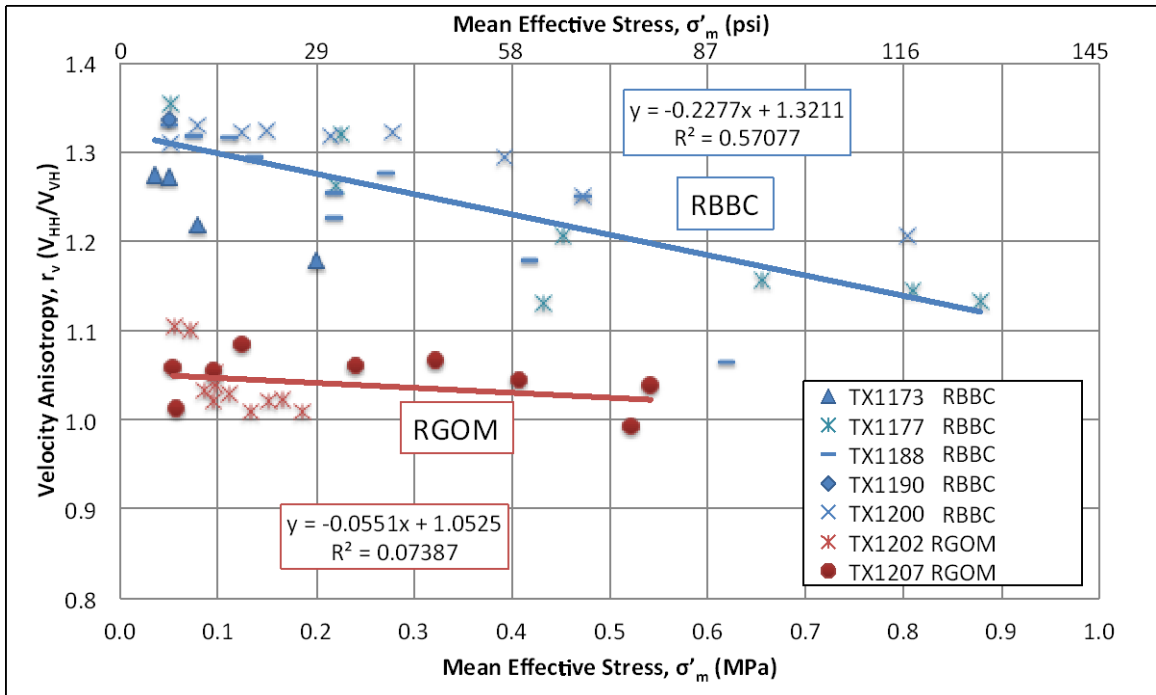


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