Laboratory Measurements of Velocity Anisotropy in High Porosity TI Material

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ABSTRACT

Naturally occurring cohesive soil deposits are inherently anisotropic. This anisotropy is primarily due to the process of sedimentation followed by predominantly one-dimensional compression. The influence of the elastic anisotropy on the seismic velocities can often be quite strong. Having a better understanding of the magnitude of anisotropy in wave velocities will result in more accurate seismic imaging, soil properties interpretation, and pore pressure predictions. Velocity anisotropy has been studied thoroughly in low porosity (n<0.15) and overconsolidated rocks. This study, however, focuses on high porosity (n>0.25) TI material under K_0 consolidation. The laboratory measurements of the five independent velocities make it possible to compute the stiffness and compliance matrices at each stress level, using Thomsen's equations. Test results are provided for RGoM-EI in the stress range of 1 to 10 MPa, which show insignificant velocity anisotropy, both in P and S waves.

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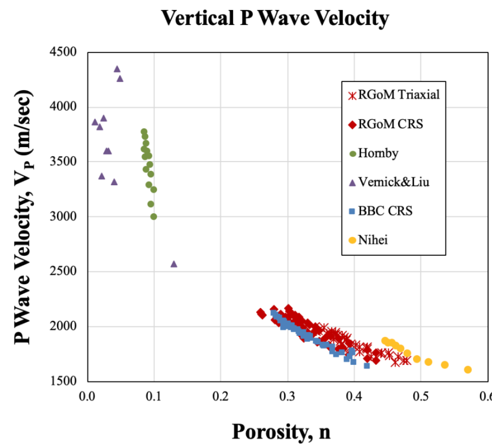

Fig 1: High and low porosity domains

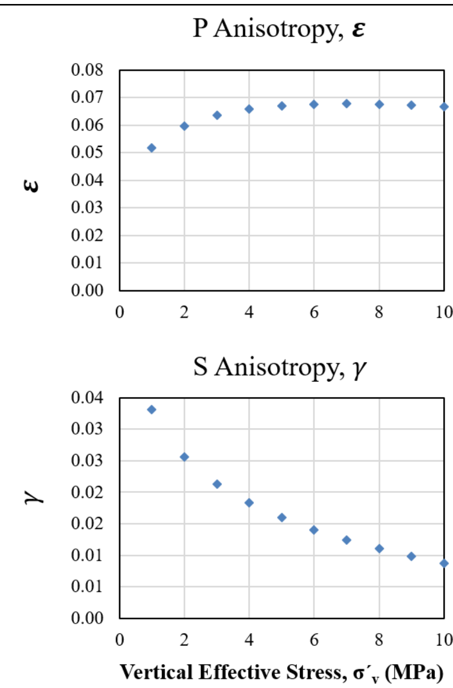

Fig 2: RGoM-EI material anisotropy

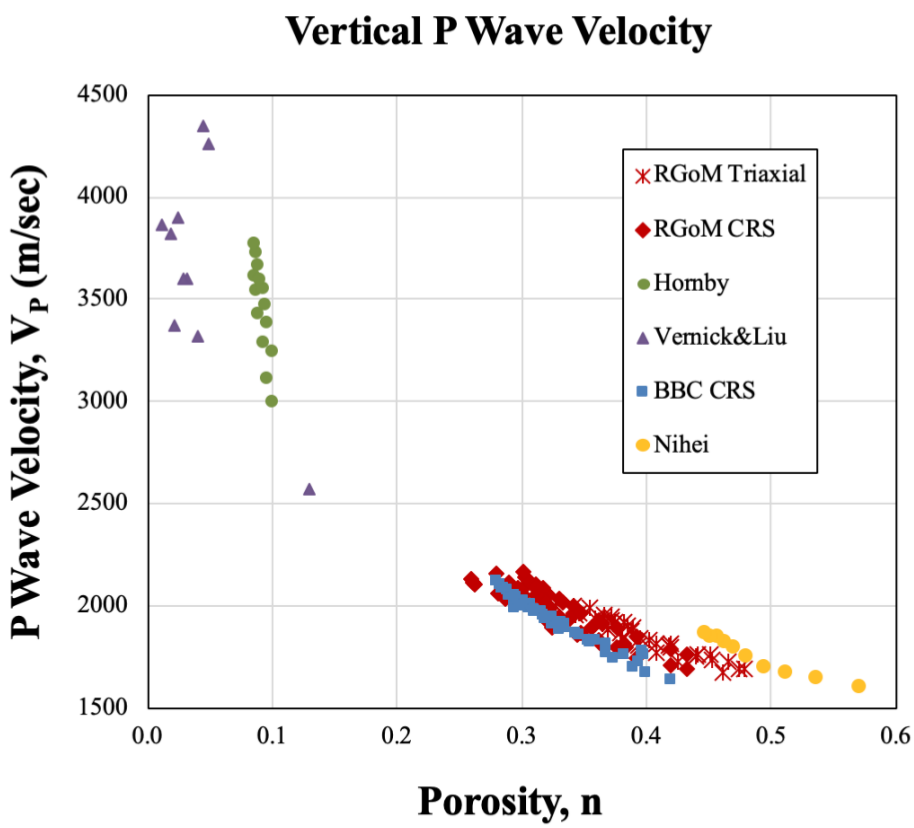

Fig. 1: High and low porosity domains

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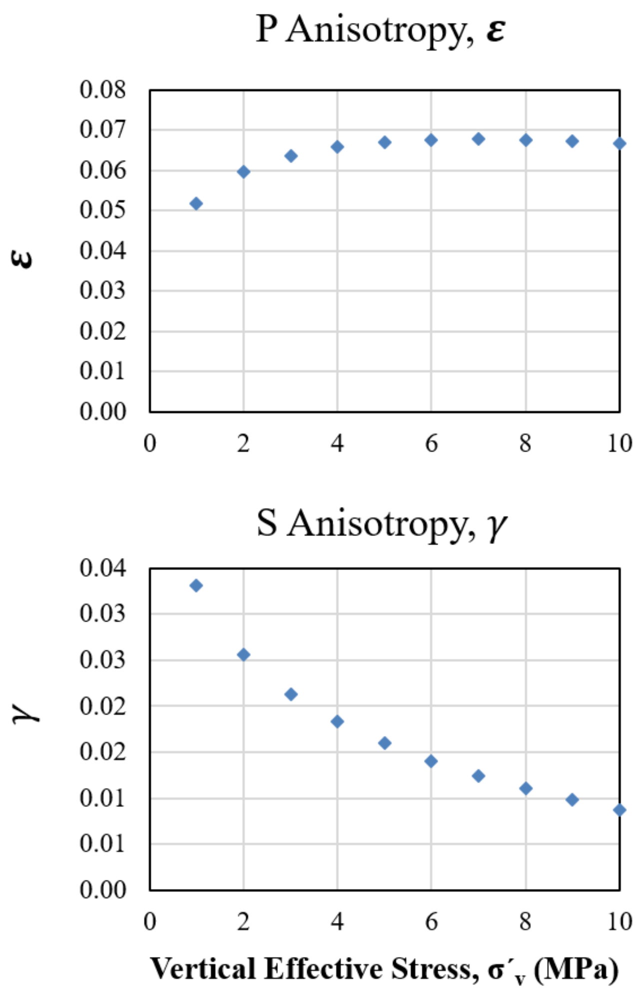

Fig. 2 : RGoM-EI material anisotropy

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