Effects of Anisotropy on Wave Behavior

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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. We have developed new technology using piezoceramic crystals that allows measurement of three compressional and two shear wave velocities in a single specimen during K_0 compression. The addition of crystals attached to the specimen sides allows both horizontal and vertical directional measurements. Also generating the P signal from the side crystal we are able to receive it on the top crystal which corresponds to the inclined P wave. The five independent velocities make it possible to compute the stiffness and compliance matrix at each stress level. Test results are provided for RGoM-EI in the stress range of 1 to 10 MPa.

CLICK ON IMAGE FOR LARGER VIEW

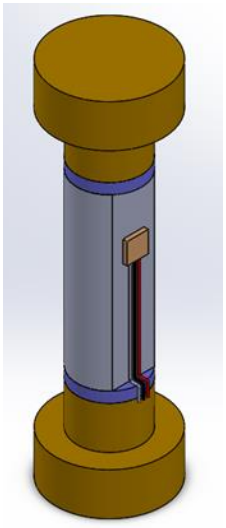


Fig 1: Horizontal crystals placed on the flattened sides of a cylindrical specimen

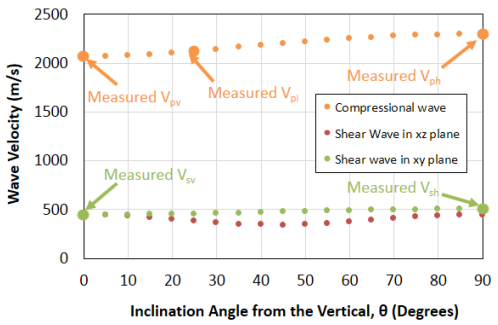
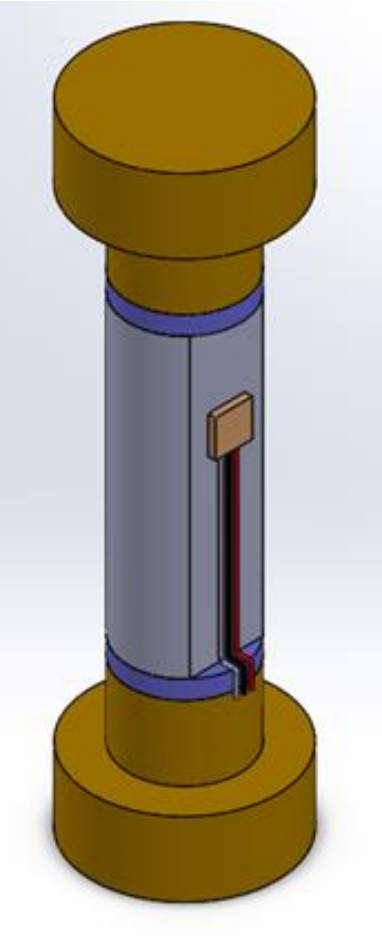


Fig 2: Inclined velocity determination using the stiffness matrix calculated from the measured velocities



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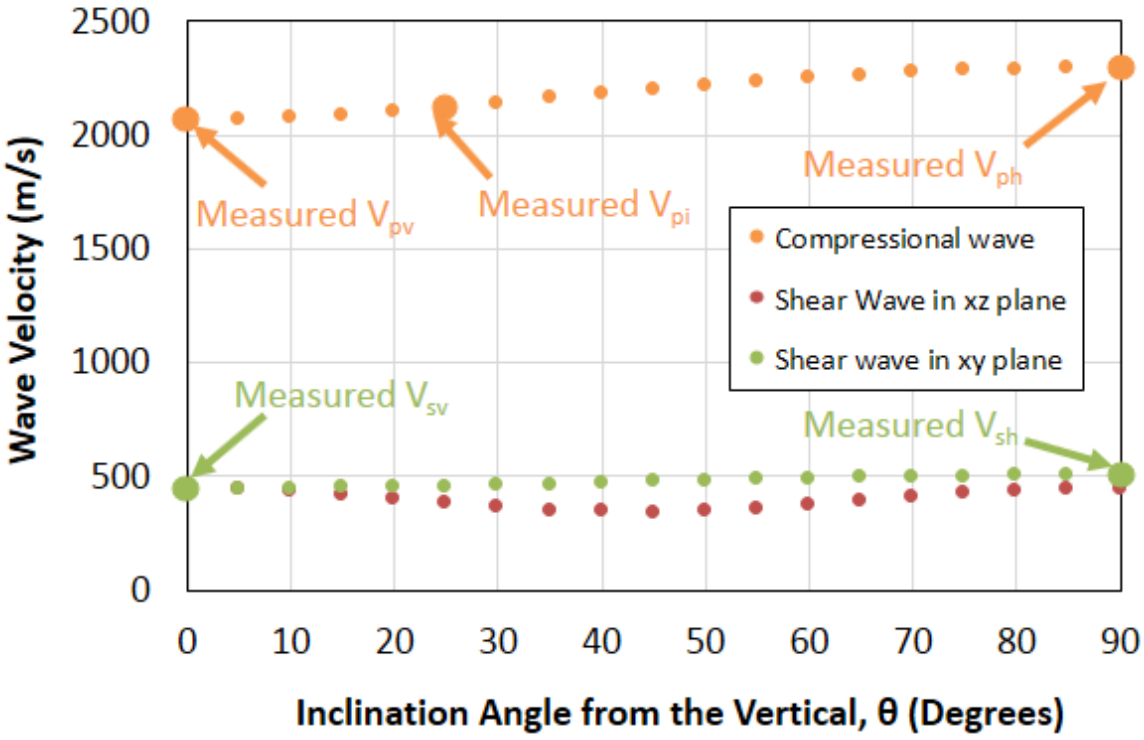

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