06.07: Shear and P Wave Velocity of Sands

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ABSTRACT

Pressure and shear wave velocities have historically been difficult to measure in laboratory conditions. Using triaxial cell endcaps with piezoelectric transducers, velocity measurements can be taken in sand. Measurements were taken in dry and saturated sands under isotropic effective stresses ranging from 1 MPa to 10 MPa. An example signal and interpreted arrival time for a P wave at 4 MPa is shown in **Fig 1**.

The velocity measurements in dry and water-saturated sands were used to evaluate the Biot-Gassmann fluid substitution equations. Experimentally measured and Biot-Gassmann predicted P wave velocities are seen on the plot in **Fig 2**. The predictions are accurate over the full range of stress conditions.

CLICK ON IMAGE FOR LARGER VIEW

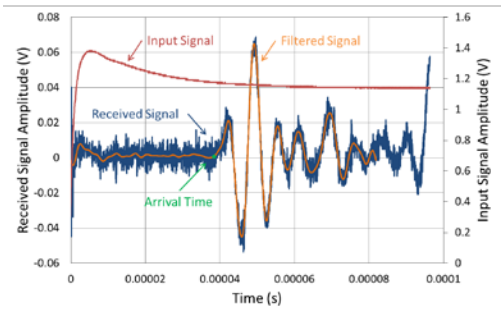


Fig 1: Input and received signals for P wave in sand using piezoelectric transducers in triaxial cell endcaps. The signal is filtered using an FFT to clarify the wave arrival time.

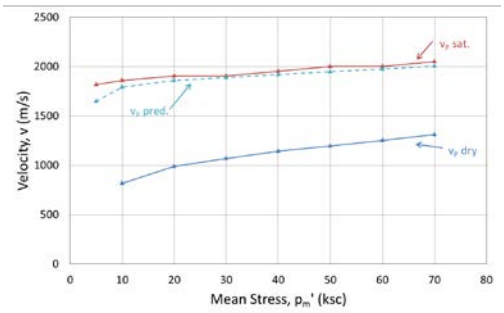
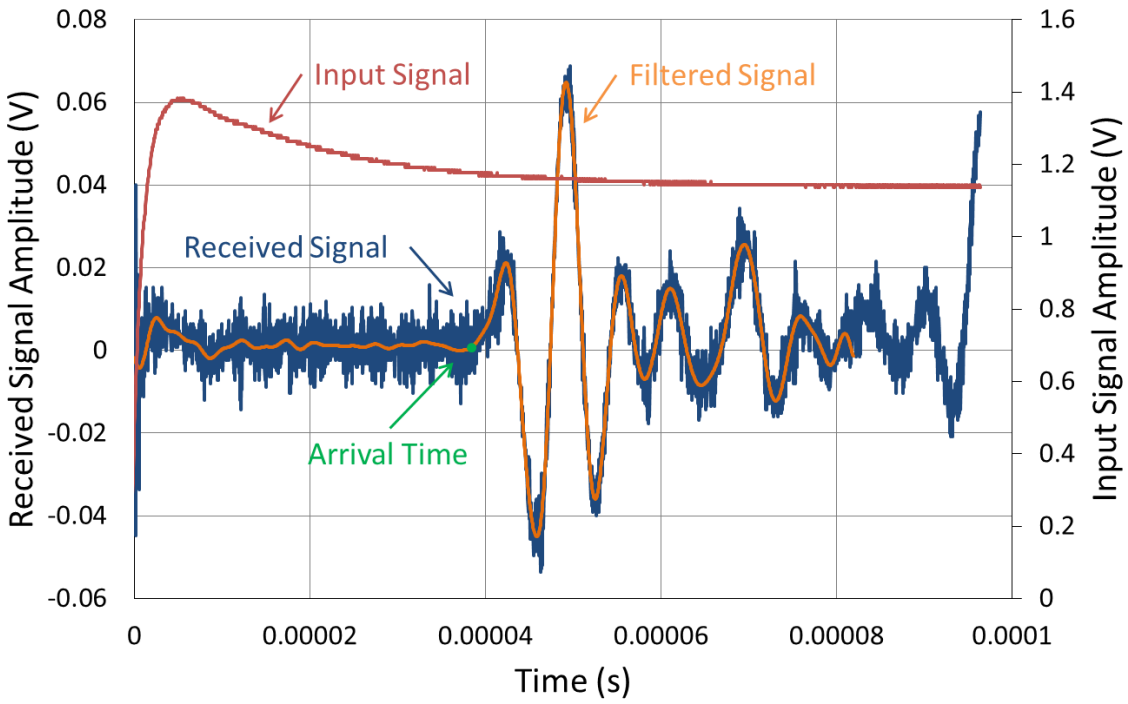


Fig 2: Comparison of experimental and Biot-Gassmann predicted P wave velocities.



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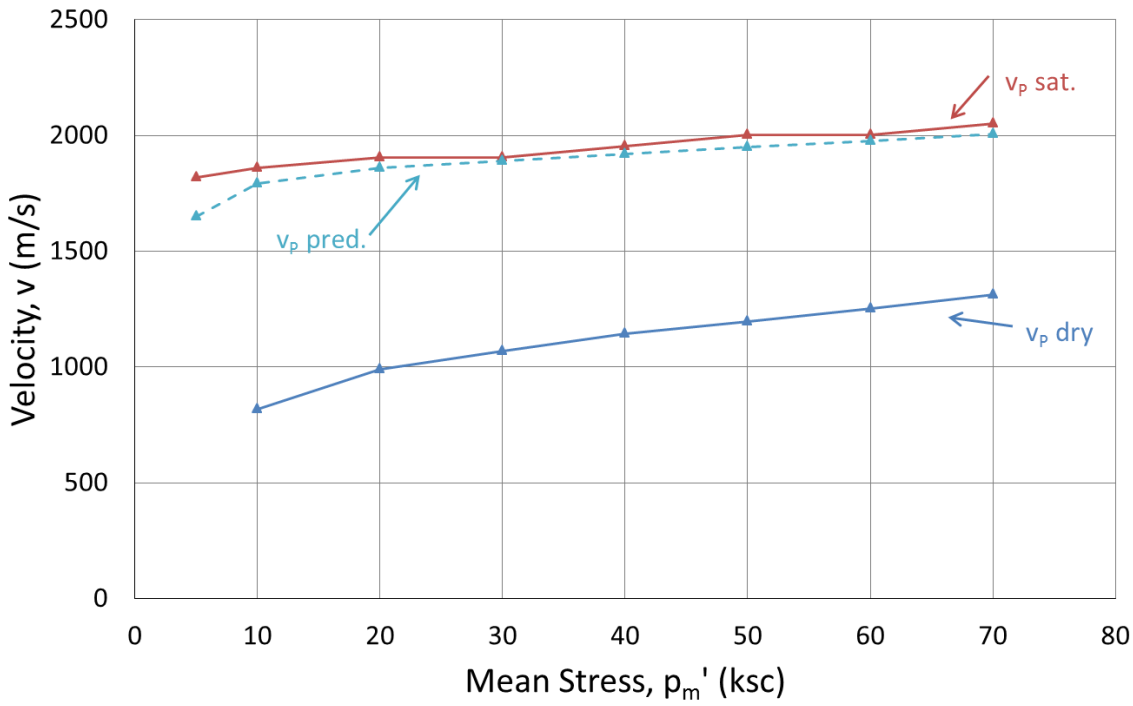

Fig. 2: Comparison of experimental and Biot-Gassmann predicted P wave velocities.

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