A Comprehensive Study of Bender Elements and Their Use for Interpreting the Small Strain Shear Modulus of a Soil Specimen

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ABSTRACT

The subject of this study is the use of Bender Elements that send shear waves through soil specimens at varying frequencies. This allows us to obtain an output signal as a function of time, which can be used to interpret the arrival time of the signal from one end of the specimen to the other. Thus the velocity of the wave is determined, which is directly used in the following equation to calculate the elastic shear modulus:

$$G_{max}=\rho V_S^2$$

We will observe both the effect that different confining stresses have on the results, as well as altering the specimen boundary conditions and comparing them to the FEM models created by a colleague.

A better understanding of this Bender Element methodology of calculating the shear modulus will allow us to create results with higher accuracy and at a much quicker rate.

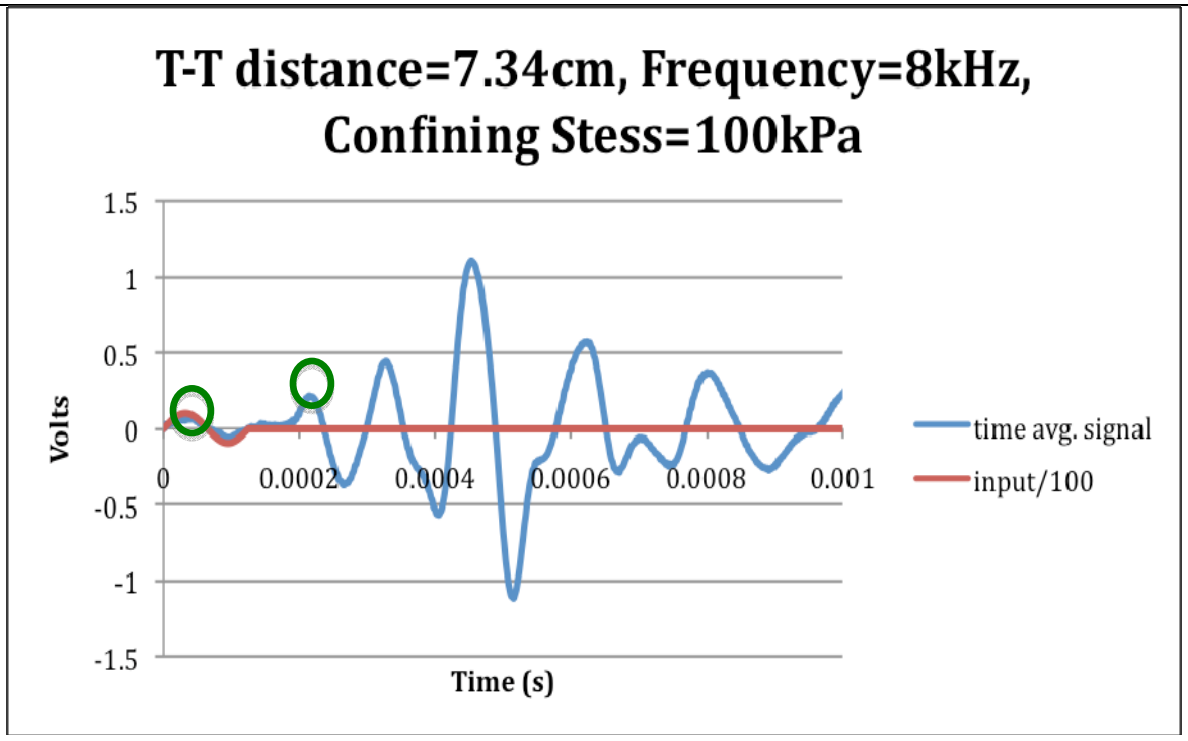

Figure 1: Output signal of a specimen of Ticino Sand at a density of 1.5gcm3. The arrival time is taken from peak to peak (see circled regions). The specimen is in an acrylic tube and prepard via the tamping method