

**THE MEASUREMENT OF SHEAR WAVES VELOCITY
BY MEANS OF LABORATORY TESTS**

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ABSTRACT

The purpose of the work presented herein is the measurement of shear waves velocity in soil by means of the bender element method and the comparison of the results of bender element tests with the results of the resonant-column tests.

Initially, the principles of operation of bender elements as well as their characteristics are presented. More specifically, the type of material, connections and polarization, dimensions, insulation, frequency response and damping are discussed. The installation of the bender elements in the cyclic triaxial apparatus consisted of the modification of the top cap and the base pedestal of the apparatus for the embedment of the bender elements, the insulation of the bender elements, as well as the excitation and recording system.

Analytical formulations for the computation of the wave propagation, generated by a point load, may give a solution to the near field effect problem, which appears in the time domain analyses. In addition frequency domain and numerical analysis methods are suggested. The main factors influencing the results are also presented with the aid of the corresponding solutions. Comparative tests on dry Toyoura sand specimens using the bender element and the resonant-column method are presented. The results are also compared with empirical relationships for the determination of shear modulus.

The comparison of the results of the bender element tests and the resonant column tests indicates a difference, which may attributed to the different density of the specimens used in the tests. The bender element method compares well the empirical relationships. It is suggested that the installation of the receiver to the base pedestal may result in the reduction of the noise, generated by the load cell. The noise that remained, even after the disconnection of the load cell, may imply the change or the extra insulation of the cords and the attachments.