



# UCSC

SEMINARIO DEL DEPARTAMENTO DE MATEMÁTICA Y FÍSICA APLICADAS  
FACULTAD DE INGENIERÍA

---

## Using piezoelectric elements to study the dynamic properties of the Bío Bío sand

**Dr. Felipe Villalobos Jara**

Facultad de Ingeniería

Universidad Católica de la Santísima Concepción

### Abstract

The objective of this work is to study the dynamic properties of Bío Bío sand, in particular its shear stiffness. To this end, a system to measure the travel time of shear waves in Bío Bío sand samples using piezoelectric elements of the bender element type was designed and setup in an adapted oedometer device. Measurements were carried out for sand samples with different relative density, pressure/deformation, diameter/height, dry/saturated and varying the frequency, amplitude, and type of the triggered electric signals. The shear wave velocity and elastic shear modulus increased with relative density and effective vertical stress as previously found by other authors. As a form to compare these results with previous works, Hardin type empirical formulas for estimating the elastic shear modulus were used. Estimations proved to be good only in loading for effective vertical stresses around 100 kPa, since underestimation and overestimation of the shear modulus occurred for stresses below and above that value, respectively. Soil shear stiffness during unloading/reloading cycles was underestimated with the expressions used for loading.

Martes 13 de Junio de 2017, 16 : 20 horas  
Auditorio San Agustín (Facultad de Ingeniería)

---

#### Coordinadores:

Johanna García, Departamento de Matemática y Física Aplicadas, [jgarcias@ucsc.cl](mailto:jgarcias@ucsc.cl)

Tomás Barrios, Departamento de Matemática y Física Aplicadas, [tomas@ucsc.cl](mailto:tomas@ucsc.cl)