

Study on Rayleigh Wave Inversion for Estimating Shear-wave Velocity Profile

by T.A. Sanny*, Yoes Avianto*

***Geophysical Engineering Department, Faculty of Earth Science and Mineral
Technology, Institut Teknologi Bandung
Jalan Ganesha 10 Bandung 40135, Phone/fax : (62) (22) 2509168**

Abstract

Rayleigh wave or ground roll is a noise in seismic body waves. However, how to use this noise for soil characterization is very interesting since Rayleigh wave phase velocity is a function of compression-wave velocity, shear-wave velocity, density and layer thickness. In layered-medium Rayleigh wave velocity also depends on wavelength or frequency, and this phenomenon is called dispersion. Inversion procedure to get shear-wave velocity profile needs the priori information about the solution of the problem to limit the unknown parameters. The Lagrange multiplier method was used to solve the constrained optimization problems or well known as a smoothing parameter in inversion problems. The advantage of our inversion procedure is that we can guarantee the convergence of solution even though the field data is incomplete, insufficient, and inconsistent and the addition of smoothing parameter can reduce the time to be convergence. Beside numerical stability, the statistical stability are also involved in inversion procedure. Then, it has been applied on synthetic models, single and two layer lying on semi-infinite medium. In field experiment we extracted ground roll data from seismic refraction record. Then, the dispersion curves had been constructed by applying f - k analysis and f - k dip filtering.