Geophysical Research Abstracts
Vol. 16, EGU2014-12735, 2014
EGU General Assembly 2014

Inversion of H/V in layered media from seismic ambient noise based on the diffuse field theory and on improved calculation of Green functions

Francisco J. Sánchez-Sesma (1), José Piña (1), Antonio García-Jerez (2), Francisco Luzón (2,3), and Mathieu Perton (1)

(1) Instituto de Ingeniería, Universidad Nacional Autónoma de México, Mexico (sesma@unam.mx, ead2009@hotmail.com,mperton@iingen.unam.mx), (2) IAG, Universidad de Granada, Granada, Spain (agjerez@ugr.es), (3) Dpto. Química y Física, Universidad de Almería, Almería, Spain (fluzon@ual.es)

The microtremor H/V spectral ratio (MHVSR) is widely used to assess the dominant frequency of soil sites. Measurements are relatively simple as only one station is needed. It has been recently proposed a theoretical basis linking ambient noise vibrations with diffuse field theory. In this theory the directional energy density computed as the average spectral density of motion at a point, is proportional to the imaginary part of Green function at the observation point. Appropriate normalization is crucial to make the experimental spectral ratios closer to the theoretical counterpart. According to this theory the square of H/V is twice the ratio ImG_{11} / ImG_{33}, where ImG_{11} and ImG_{33} are the imaginary part of Green functions at the load point for horizontal and vertical components, respectively.

In order to efficiently compute the imaginary part of Green's functions in a layered medium we start from an integral on the complex k plane and, using Harkrider's nomenclature, separate formulae for body-, Rayleigh-, and Love-wave components to the spectral densities are obtained. Then the poles allow for integration using the Cauchy residue theorem plus some contributions from branch integrals.

It is possible to isolate pseudo reflections from ImG_{11} and thus constrain the inversion of soil profile. We assess ImG_{11} removing the influence of illumination spectrum using the H/V spectral ratio and an estimate of ImG_{33} (from an *a priori* model) by means of ImG_{11}=0.5$(H/V)^2$*ImG_{33}. It has been found that ImG_{33} is less sensitive to details of stratigraphy. In fact, the Poisson ratio of the uppermost layer controls the slope in high frequency. With the obtained model ImG_{33} can be updated and the estimate of ImG_{11} will be improved.

ACKNOWLEDGEMENTS. This research has been partially supported by DGAPA-UNAM under Project IN104712, by the MINECO research project CGL2010-16250, Spain, by the EU with FEDER, and the AXA Research Fund.