Geophysical Research Abstracts
Vol. 20, EGU2018-10968, 2018
EGU General Assembly 2018

Modelling of Microtremor Horizontal-to-Vertical Spectral Ratio for media with a two-dimensional lateral irregularity

Francisco J. Sánchez-Sesma (1), Antonio García-Jerez (2), Francisco Luzón (2), Shinichi Matsushima (3), and Hiroshi Kawase (3)

(1) Instituto de Ingeniería, Universidad Nacional Autónoma de México, Coyoacán 04510 CDMX, Mexico, (2) Universidad de Almeria, Dpto. Química y Física, CITE II-A, La Cañada, Spain, (3) Disaster Prevention Research Institute, Kyoto University, Gokasho, Uji; Kyoto 611-0011, Japan

We present a method to model the microtremor horizontal-to-vertical (H/V) spectral ratio (MHVR) in three dimensions for media with two-dimensional heterogeneity. This approach is based on the diffuse field theory and implies the use of imaginary part of Green's functions at the source in such a way that MHVR corresponds to the square root of the ratio between the imaginary part of the horizontal Green's function and that of the vertical one. For full three-dimensional (3D) settings, this calculation may be extremely time consuming. However, for 2D lateral irregularity the use of Fourier transform along the transverse axis produce significant computational savings using the indirect boundary element method (IBEM) in a 2.5D formulation.

The full-space Green's functions used within the 2.5D-IBEM to compute the desired Green′s function are those of a harmonic point force moving along the transverse axis. We validate the method by comparisons with the analytical solutions of some canonical problems. In fact, we reproduced the solution for MHVSR for a 1D layered medium.

We use this formulation to model the observations at the Dalías Experimental Field in southern Spain in which significant lateral irregularity has been detected. Although the observed microtremor spectral ratios are relatively stable, they show the effect of lateral variations related to the lateral irregularity.

ACKNOWLEDGEMENTS: This investigation has the partial support of the Spanish Ministry of Economy and Competitiveness under Project CGL2014-59908, the European Union with ERDF, the AXA Research Fund and the DGAPA-UNAM under Project PAPIIT-IN100917.