



# Seismic Wave Amplification in 3D Alluvial Basins: Aggravation factors from Fast Multipole BEM Simulations

Kristel Carolina Meza Fajardo, Jean-François Semblat, Stéphanie Chaillat,  
Luca Lenti

## ► To cite this version:

Kristel Carolina Meza Fajardo, Jean-François Semblat, Stéphanie Chaillat, Luca Lenti. Seismic Wave Amplification in 3D Alluvial Basins: Aggravation factors from Fast Multipole BEM Simulations. 16th World Conference on Earthquake Engineering, Jan 2017, Santiago, Chile. hal-01309474

**HAL Id: hal-01309474**

**<https://brgm.hal.science/hal-01309474>**

Submitted on 29 Apr 2016

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

# **Seismic Wave Amplification in 3D Alluvial Basins: Aggravation factors from Fast Multipole BEM Simulations**

By:

Kristel C. Meza-Fajardo, Jean-François Semblat, Stéphanie Chaillat and Luca Lenti

In this work, we study seismic wave amplification in alluvial basins having 3D canonical geometries through the Fast Multipole Boundary Element Method in the frequency domain. We investigate how much 3D amplification differs from the 1D (horizontal layering) and the 2D cases. Considering synthetic incident wave-fields, we examine the relationships between the amplification level and the most relevant physical parameters of the problem (impedance contrast, 3D aspect ratio, vertical and oblique incidence of plane waves). The FMBEM results show that the most important parameters for wave amplification are the impedance contrast and equivalent shape ratio. Using these two parameters, we derive simple rules to compute the fundamental frequency for different 3D basin shapes and the corresponding 3D aggravation factor for 5% damping. Effects on amplification due to 3D basin asymmetry are also studied and incorporated in the derived rules.