Geophysical Research Abstracts, Vol. 8, 09510, 2006
SRef-ID: 1607-7962/gra/EGU06-A-09510

Uncertainties in Mexico City compressible soils nonlinear dynamic properties and their effects on the maximum responses to extreme magnitude earthquakes

M. Chavez (1), R. Madariaga (2), P.M. Mai (3), E. Cabrera (4) , N. Perea (1)

(1) Institute of Engineering, UNAM, Mexico City, Mexico (marioch48@yahoo.com), (2) Ecole Normale Superieure, Paris, France (raul.madariaga@ens.fr), (3) Institute of Geophysics, ETH, Zurich, Switzerland (martin@seismo.ifg.ethz.ch), (4) DGSCA, UNAM, Mexico City, Mexico (eccf@super.unam.mx)

The large amplifications of the seismic response of Mexico City (MC) compressible soils, with respect to the corresponding to its firm or rock sites during the 19/09/1985 Michoacan Ms 8.1, Mw 8.01, subduction superficial thrust mechanism earthquake, were associated to the widespread damage observed in MC infrastructure during this event. Indeed, maximum horizontal ground accelerations, Amax and maximum horizontal response spectra accelerations, Samax(5 percent), of about 200 and 1000 cm/s^2 were observed on MC compressible soil sites, versus 40 and 130 cm/s^2 on its firm or rock sites, respectively. In this work we propose and apply a procedure to analyze the effects of the uncertainties in the dynamic properties of MC compressible soils on their seismic responses under extreme magnitude earthquakes scenarios, Mw 8.5, occurring in the so-called, Guerrero gap, of the same type as the 19/09/1985 one. The surface motions expected in MC compressible soils for the scenario events, were obtained by applying sets of firm soil 3D broadband synthetic records, obtained for the Mw 8.5 earthquakes (Chavez et al., AGU Fall Meeting, 2005) applied at the base of soil columns that characterize MC compressible soils. The uncertainties on the nonlinear dynamic properties of the latter were represented by the shear modulus ratio (G/Go) and the damping curves, which synthesize the uncertainties in the field and laboratory tests performed on MC compressible soils since the end of 1985 up to 2005. From the extreme Mw 8.5 scenarios analyzed, 50 horizontal synthetic accelerograms were generated for MC compressible soils, from which statistics of Amax and Samax(5 percent) were computed. Among other results, based on the latter, we propose up-

per bounds (Mean + 3 standard deviations) for Amax, and Samax(5 percent), of 400 and 2000 cm/s^2, for the strong ground motions expected in the compressible soils of Mexico City, respectively.