NUMERICAL MODELLING OF SEISMIC WAVE PROPAGATION BY TAKING INTO ACCOUNT 2D NON-LINEARITY EFFECTS IN SUPERFICIAL SOIL LAYERS

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It has long been recognised that the effects of superficial geological layers, or site effects, can play a major role on the seismic ground motion at the free surface. Moreover, soil non-linearity can increase the complexity of wave propagation for strong shaking under particular soil conditions. In this study, we compute wave propagation in a 2-D asymmetrical basin considering both soil non-linearity and pore-pressure effects. Equations of elastodynamics of wave propagation are solved using the spectral element method (SEM). The coupling of vertically propagating waves and the waves specifically generated in 2-D model leads to waves whose amplitude and duration are higher than the 1-D case. This multidimensional impact increases material non-linearity. Such complex wavefield provokes larger deformation and higher pore-pressure rise that cannot be predicted by 1-D modelling. Therefore, our study suggests the use of multidimensional modelling while studying seismic wave propagation in both linear and non-linear complex media.