

Deterministic and Probabilistic Analysis of the HRB Seismic Resistance Considering SSI Effects

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Abstract

This paper presents a comparative study of deterministic and probabilistic analysis of the seismic resistance of a tall building in the interaction with the subsoil. The aim is to highlight the main uncertainties of the calculation model, which significantly influence the behavior of the structure during seismic activity. Seismic response is solved by the method of spectral analysis of the design acceleration spectrum as recommended by Eurocode ENV 1998. The uncertainty calculation model properties and durability of structures are considered in the deterministic method of the characteristic values and, if probabilistic methods of probability density of the material properties and load in accordance of the recommendations of Eurocode and JCSS standard. The LHS and RSM methods were used for the numerical simulations. The sensitivity analysis of the influence of the variability of the input data to the seismic resistance of the building is presented on the base of the Spearman method. The efficiency of these methods is compared. The analyses were applied for the thirteen floor building with one underground and twelve storeys. The supporting system consists of reinforced concrete structure a set of columns, inner cores and outer walls. The deterministic and probabilistic seismic analyses were solved using ANSYS software R 13.

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