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Dynamic Response of Structure-Raft-Pile-Soil with Respect to System Frequency

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Abstract : In the present research, a series of 3-D finite element numerical modeling was performed to study the effect of system frequency and excitation specifications on the internal forces of the piled raft (PR) system in a dry sand layer. The results of numerical simulations were first compared with those associated with centrifuge tests. The natural frequency of superstructure, modeled on the piled raft foundation, was smaller than the natural frequency of the fixed-base super-structure. This difference was greater for super-structures with higher frequencies. In PR systems, the excitation with a frequency close to the system frequency produced the largest responses. Furthermore, based on the results of presented numerical analyses, ignoring the interactions and characteristics of all components of a pile-raft-structure, may lead to highly uneconomical design.

Keywords : centrifuge test, excitation frequency, natural frequency of super-structure, piled raft foundation, 3-D finite element model
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