Three Dimensional Dynamic Analysis of Water Storage Tanks Considering FSI Using FEM

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Abstract : In this study, to investigate and analyze the seismic behavior of concrete in open rectangular water storage tanks in two-dimensional and three-dimensional spaces, the Finite Element Method has been used. Through this method, dynamic responses can be investigated together in fluid storages system. Soil behavior has been simulated using tanks boundary conditions in linear form. In this research, in addition to flexibility of wall, the effects of fluid-structure interaction on seismic response of tanks have been investigated to account for the effects of flexible foundation in linear boundary conditions form, and a dynamic response of rectangular tanks in two-dimensional and three-dimensional spaces using finite element method has been provided. The boundary conditions of both rigid and flexible walls in two-dimensional finite element method have been considered to investigate the effect of wall flexibility on seismic response of fluid and storage system. Furthermore, three-dimensional model of fluid-structure interaction issue together with wall flexibility has been analyzed under the three components of earthquake. The obtained results show that two-dimensional model is also accurately near to the results of three-dimension as well as flexibility of foundation leads to absorb received energy and relative reduction of responses.

Keywords : dynamic behavior, flexible wall, fluid-structure interaction, water storage tank

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