

Seismic Behavior of Ground Rested Rectangular RC Tank Considering Fluid-Structure-Soil Interaction

Abstract:

Many liquid storage tanks around the world have affected by earthquakes. Seismic analysis of such tanks is much complicated due the Fluid-Structure Interaction (FSI). Furthermore, when the soil properties are taken into consideration, the analysis with the Fluid-Soil-Structure Interaction (FSSI) becomes very complicated and tedious. In this paper, a 3-D Finite Element (FE) model for a shallow rectangular rested on soil Reinforced Concrete (RC) tank is constructed using the FE software; ANSYS. Furthermore, a nonlinear dynamic time history analysis is carried out to investigate the behavior of this type of tanks during earthquake considering the FSSI. The vertical and the horizontal components of three ground motion records are used in the study with different frequency contents. Moreover, two different soil types are considered. The effects of the FSSI and the ground motions on the straining actions at the tank's walls at the base, the sloshing and, the hydrodynamic pressure are obtained and discussed. It is concluded that the dynamic behavior of the rectangular tank system is sensitive to the frequency content of the ground motion. In addition, the FSSI has great effects on the seismic behavior of such type of tanks, which should be taken into account in the design