

Seismic behavior of cylindrical ground tanks with dual concrete and elastic baffle system

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Storage tanks are among the structures that are widely used in water transmission systems and oil complexes. In general, liquid leakage and tank damage lead to loss of life and severe financial losses. Also, it is important to know the damages caused to the reservoir structure after the earthquake and to apply innovative techniques for the energy dissipation of the earthquake. In this study, to improve the seismic performance of concrete tanks, double concrete and elastic annular baffles have been used as a mechanism to increase the damping nature of fluid sloshing inside the tank. To increase the efficiency of the baffles, on the one hand, a larger surface is needed, and on the other hand, it isn't possible to use concrete baffles executively; therefore, in this study, elastic baffles are used on a much wider surface of the tank next to the concrete baffle. To carry out this research, three cylindrical concrete tanks with different heights and diameters were modeled in ANSYS finite element software and time history analysis was performed on these tanks. According to the results, although the use of concrete and elastic baffles leads to a reduction in sloshing, it increases the base shear and overturning moment. However, the increase in the width of the elastic baffle didn't significantly change the base shear and the overturning moment while reduces the sloshing.

Keywords: Storage tank, Dual Concrete and Elastic Baffles, Sloshing, ANSYS, Finite Element, Base Shear, Overturning Moment.