عنوان مقاله:

Elephant’s Foot Buckling of Cylindrical Steel Storage Tanks Subjected to Earthquake Excitation

محل انتشار:

ششمین کنگره ملی مهندسی عمران (سال: 1390)

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نویسندگان:

H. Moghaddam - *Faculty of Civil Engineering, Sharif University of Technology, Tehran, Iran*

S. Sangi - *Civil Engineering Department, Sharif University of Technology, Tehran, Iran*

خلاصه مقاله:

Thin metal cylindrical shell structures such as silos and tanks are susceptible to an elastic–plastic instability failure at the base boundary known as elephant’s foot buckling, due to its characteristic deformed shape. This form of buckling occurs under high internal pressure accompanied by axial compression in the shell structure. This work concerns with Theoretical studies on elephant's foot buckle failure of ground-supported, cylindrical liquid storage tanks under horizontal excitation. The buckling loads are obtained from finite elements models and codes and are compared. Theoretical nonlinear seismic analyses are carried out using ANSYS package. Studies are conducted on 13 models of cone roof tanks with height to diameter ratios (H/D) between 1 and 2, and a liquid level of 85% of the height of the cylinder with and without axial constraint at the point diametrically opposite the loading. The results are compared to which of the codes API 650, NZSEE guidelines and Eurocode 8. The comparisons of analytical buckling loads and those obtained by the codes reveal the following. Tanks designed by the codes API650 and Eurocode 8 tend to be unsafe due to elastic-plastic buckling occurrence of the shell. However, NZSEE guidelines have a near coherence to the analysis results. It is also obtained from the results that constraints at the base of the tank reduces sloshing height .While cause the buckling capacity to rise up

کلمات کلیدی:

Storage Tanks, Elephant's Foot Buckling, Seismic Analysis, Finite Element