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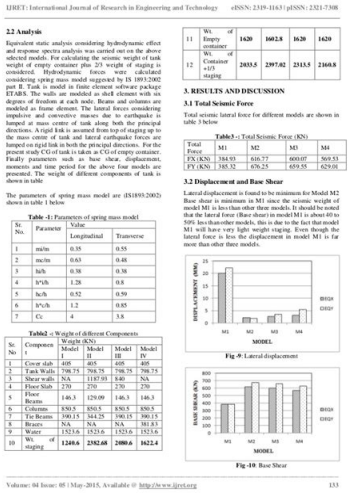

IJRET: International Journal of Research in Engineering and Technology eISSN: 2319-1163 | pISSN: 2321-7308

2.2 Analysis

Equivalent static analysis considering hydrodynamic effect and response spectra analysis was carried out on the above selected models. For calculating the seismic weight of tank weight of empty container plus 2/3 weight of staging is considered. Hydrodynamic forces were calculated considering spring mass model suggested by IS 1893:2002 part II. Tank is model in finite element software package ETABS. The walls are modeled as shell element with six degrees of freedom at each node. Beams and columns are modeled as frame element. The lateral forces considering impulsive and convective masses due to earthquake is lumped at mass centre of tank along both the principal directions. A rigid link is assumed from top of staging up to the mass centre of tank and lateral earthquake forces are lumped on rigid link in both the principal directions. For the present study CG of tank is taken as CG of empty container. Finally parameters such as base shear, displacement, moments and time period for the above four models are presented. The weight of different components of tank is shown in table

The parameters of spring mass model are (IS1893:2002) shown in table 1 below

Table -1: Parameters of spring mass model

Sr. No.	Parameter	Value	
		Longitudinal	Transverse
1	mi/m	0.35	0.55
2	mc/m	0.63	0.48
3	hi/h	0.38	0.38
4	h*i/h	1.28	0.8
5	hc/h	0.52	0.59
6	h*c/h	1.2	0.85
7	Cc	4	3.8

Table2 -: Weight of different Components

Sr. No	Componen t	Weight (KN)			
		Model I	Model II	Model III	Model IV
1	Cover slab	405	405	405	405
2	Tank Walls	798.75	798.75	798.75	798.75
3	Shear walls	NA	1187.05	840	NA
4	Floor Slab	270	270	270	270
5	Floor Beams	146.3	129.09	146.3	146.3
6	Columns	850.5	850.5	850.5	850.5
7	Tie Beams	390.15	344.25	390.15	390.15
8	Braces	NA	NA	NA	381.83
9	Water	1523.6	1523.6	1523.6	1523.6
10	Wt. of staging	**1240.6**	**2382.68**	**2080.6**	**1622.4**
11	Wt. of Empty container	**1620**	**1602.8**	**1620**	**1620**
12	Wt. of Container +1/3 staging	**2033.5**	**2397.02**	**2313.5**	**2160.8**

3. RESULTS AND DISCUSSION

3.1 Total Seismic Force

Total seismic lateral force for different models are shown in table 3 below

Table3 -: Total Seismic Force (KN)

Total Force	M1	M2	M3	M4
FX (KN)	384.93	616.77	600.07	569.53
FY (KN)	385.32	676.25	659.55	629.01

3.2 Displacement and Base Shear

Lateral displacement is found to be minimum for Model M2 Base shear is minimum in M1 since the seismic weight of model M1 is less than other three models. It should be noted that the lateral force (Base shear) in model M1 is about 40 to 50% less than other models, this is due to the fact that model M1 will have very light weight staging. Even though the lateral force is less the displacement in model M1 is far more than other three models.

Fig -9: Lateral displacement

Fig -10: Base Shear

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