

13TH INTERNATIONAL CONFERENCE ON CULTURE, CIVILIZATION AND SOCIAL SCIENCES



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PROCEEDINGS BOOK

Edited by
Assist. Prof. Dr. Abdussalam Ali Ahmed

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STUDY OF TANK FREQUENCY DEPENDENCE FOR DIFFERENT SHELL THICKNESS UNDER SEISMIC LOADS

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The dynamic characteristics of shell structures with compartments partially filled with liquid could be most accurately determined experimentally. However, conducting such natural experiments is expensive and not always safe procedure. Therefore, conducting virtual computer tests becomes relevant. Paper treats new effective method to determine the frequencies and shapes of tanks partially filled with liquid, taking into account various factors, such as the mutual influence of liquid sloshing and oscillations of elastic walls, the influence of the elastic base parameters, and the liquid level of tank filling [1-5].

The purpose of the study has been to develop the effective method for calculating the frequencies and oscillations forms of tanks with liquid on the elastic Winkler base, taking into account the bottom elasticity and free surface sloshing [6-8].

The shell thickness decrease leads to reduction in the elastic walls frequencies. The frequencies of empty and liquid-filled tanks for different thicknesses have been shown in the table. 1.

Table 1. Frequencies dependence on shell thickness

<i>J</i>	Empty shell, Hz				Shell with liquid, Hz			
	<i>h</i> , m							
	0.01	0.005	0.003	0.0015	0.01	0.005	0.003	0.0015
6	23.233	11.838	7.1805	3.6308	5.5213	2.8187	1.7096	0.8644
7	40.482	20.612	12.495	6.3132	15.172	7.9277	4.8058	1.5780
8	91.101	46.271	28.023	14.153	43.769	22.249	13.479	7.0064
9	205.25	100.01	62.922	31.747	119.14	58.148	36.587	15.716
10	213.55	109.10	66.127	31.778	168.05	85.909	52.069	18.692

The results indicate the lowest frequencies of the elastic shells decrease with thickness decreasing. Therefore, for very thin elastic tank walls, the first oscillation frequency of the elastic walls could be much smaller than the oscillation frequency of the fluid in the shell with rigid walls. As the thickness of the tank wall increases, this effect becomes insignificant.

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