

Nonlinear Liquid Sloshing in a Truncated Conical Tank

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The studies of nonlinear resonance liquid sloshing of an ideal incompressible liquid in a rigid truncated conical tank are presented in the report. The tank performs small-magnitude oscillatory motions with the forcing frequency close to the lowest natural sloshing frequency. The multimodal method combined with nonconformal mapping technique and the MoiseevNarimanov asymptotic relationships [1, 2] are employed to derive a infinite-dimensional modal system of nonlinear modal equations modeling the resonant slosh dynamics. Derived modal system allow to analyse a steady-state regimes and its stability. Utilizing the Lukovsky's formula [1] makes it possible to evaluate liquid force response when tank is under external harmonic excitation. Experimental researches allow to determine safe exploitation regimes of complex structures with the conical cavities.

[1] I. A. Lukovsky, *Naukova Dumka*, Kyiv, 2010.

[2] Gavrilyuk I., Hermann M., Lukovsky I., Solodun A., Timokha A., *Engineering Computations* **29**, (2012), pp. 198-220.