

Validation of Slosh Model Parameters and Anti-Slosh Baffle Designs of Propellant Tanks by Using Lateral Slosh Testing

The slosh dynamics of propellant tanks can be represented by an equivalent pendulum-mass mechanical model. The parameters of this equivalent model, identified as slosh model parameters, are slosh mass, slosh mass center of gravity, slosh frequency, and smooth-wall damping. They can be obtained by both analysis and testing for discrete fill heights. Anti-slosh baffles are usually needed in propellant tanks to control the movement of the fluid inside the tank. Lateral slosh testing, involving both random testing and free-decay testing, are performed to validate the slosh model parameters and the damping added to the fluid by the anti-slosh baffles. Traditional modal analysis procedures are used to extract the parameters from the experimental data. Test setup of sub-scale test articles of cylindrical and spherical shapes will be described. A comparison between experimental results and analysis will be presented.

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