

Comparison of numerical methods to handle sloshing events for space applications

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Fluids contained in spacecraft tanks are subject to intense sloshing events, which induce vibrations of the tanks and fatigue effects. In 1998, NASA's NEAR mission was delayed mainly for this reason. Some experimental programs like Sloshsat-FLEVO occurred since then, to understand and model such physics.

In this paper, a novel simulation approach using vibroacoustics software is proposed. The main interest of the method is its efficiency to handle the coupling between the acoustics in the fluid and the vibrations in the structure. A cross-comparison with reference methods will be shown on a non-confidential but realistic tank model. The numerical efforts and the human efforts to achieve a reasonable accuracy will be compared.