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Robustness of Input Shaping for Liquid Sloshing Suppression in a Horizontally Accelerating Container[1] DONGJOO KIM, SEONG-WOOK HONG, KYOUNGJIN KIM, Kumoh National Institute of Technology — Input shaping has been recently shown to be effective in reducing liquid sloshing, which occurs when a partially filled container experiences acceleration for fast positioning control. However, its robustness to the change of system parameters needs to be further understood because input shaping is an open-loop control without feedback sensing. Therefore, the objective of this study is to investigate the robustness of input shaping as a means of suppressing liquid sloshing in a horizontally accelerating container numerically and experimentally. In the case of numerical simulation, the governing equations for unsteady two-phase fluid motions are solved rather than using the simple and common pendulum model for free surface motion. In this study, three different input shapers (ZV, ZVD, convolved ZV shapers) are considered and their sensitivity to system frequency variation is examined for various container accelerations. The control efficiency of input shapers is evaluated in terms of the amplitude of transient peak and residual oscillations of liquid sloshing. Detailed information including dynamic behaviors of free surface will be provided in the final presentation.

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