

Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

**Control Performance of Input Shaping to Reduce Liquid Sloshing
in a Horizontally Accelerating Container** DONGJOO KIM, SEONG-WOOK

HONG, KYOUNGJIN KIM, Kumoh National Institute of Technology — Input shaping was originally developed to suppress the structural vibrations and many successful results have been reported so far. Its applicability can be extended to fluid vibrations such as liquid sloshing, which occurs when a partially filled container experiences acceleration for fast positioning control. However, its performance for sloshing suppression has not been assessed by solving the governing equations for unsteady two-phase fluid motions. Therefore, the objective of this study is to numerically investigate the performance of input shaping to reduce liquid sloshing in a horizontally accelerating container. In this study, three different input shapers (ZV, ZVD, convolved ZV shapers) are considered to eliminate the sloshing completely. With all of the shapers investigated, liquid sloshing is successfully suppressed but the control effects are quite dependent on the input shaper. In the cases of ZV (Zero Vibration) and ZVD (Zero Vibration and Derivative) shapers, liquid sloshing is suppressed to some extent, but residual vibrations still remain. On the other hand, liquid sloshing is almost eliminated with a two-mode convolved ZV shaper, which is designed to suppress the most energetic (first and third) modes.

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Date submitted: 10 Aug 2011

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