Noppadol Chaimanatsakun 2014: A Study of Low Speed Sloshing of Viscous Liquid in a Container using Finite Element Method. Master of Engineering (Mechanical Engineering), Major Field: Mechanical Engineering, Department of Mechanical Engineering. Thesis Advisor: Assistant Professor Tumrong Puttapitukporn, Ph.D. 107 pages.

Severe liquid sloshing inside partially filled liquid containers during suddenly stopped can generate enormous pressure waves which can lead to vehicle accidents or damage to the container structure. Many researchers have focused on the study of flow characteristics during sloshing period using the fluid–structure interaction algorithm implemented into the finite element method. This research was an extension of the study of Apinyamano et al. (2012) to distinct the inviscid–flow models from the viscous–flow models in the simulation of liquid sloshing using the MSC Patran and Dytran programs version 2005. The water–container models consisted of the container without the water baffle and the container with the water baffle. The water–filling capacities were 40%, 60% and 80%. This research focused on to analyze pressure wave, the surface wave, and stresses distribution on the container.

When comparing the inviscid–flow models to the viscous–flow models at the same water–filling capacity, we found the comparable results in the surface waves, the maximum wave height, and duration of occurrence of the peak von mises stress. Nonetheless, the inviscid–flow models had higher von mises stress on the container surfaces than the viscous–flow models. However, at 40% water–filling capacity, water pressure had highly oscillated so that the peak water pressure could not be identified. The water baffle could decrease the water pressure, the height of the surface wave, and the von mises stress on the container surfaces especially at 60% and 80% water–filling capacities.

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