Numerical simulation of liquid sloshing in case of filled open container subjected to horizontal excitation

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Résumé

The free surface motion which is caused by any disturbance subjected to an excitation in a direction defines sloshing phenomenon. This phenomenon may cause several problems during movement of a container with the liquid, as spillover, temperature changes, vibrations, etc. These phenomena have been modeled by Fluid dynamics or Equivalent mechanical models. However, These approaches do not lead us to simulate the motion of the free surface of the liquid during the time, so that experimental measurements may be required. The purpose of this research is to model the shape of the free surface of the liquid by the means of separation variables and experimental analysis. To this purpose, an image processing method is performed on an experimental measurement of the liquid sloshing in a case of horizontal displacement of the tank. Then, the curve of the free surface is modeled by using separation variables. At the end, the results of the analytical model and the real curve of the free surface of the liquid are compared.

Mots-Clés: Image processing, Modal analysis, Fluid dynamics

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