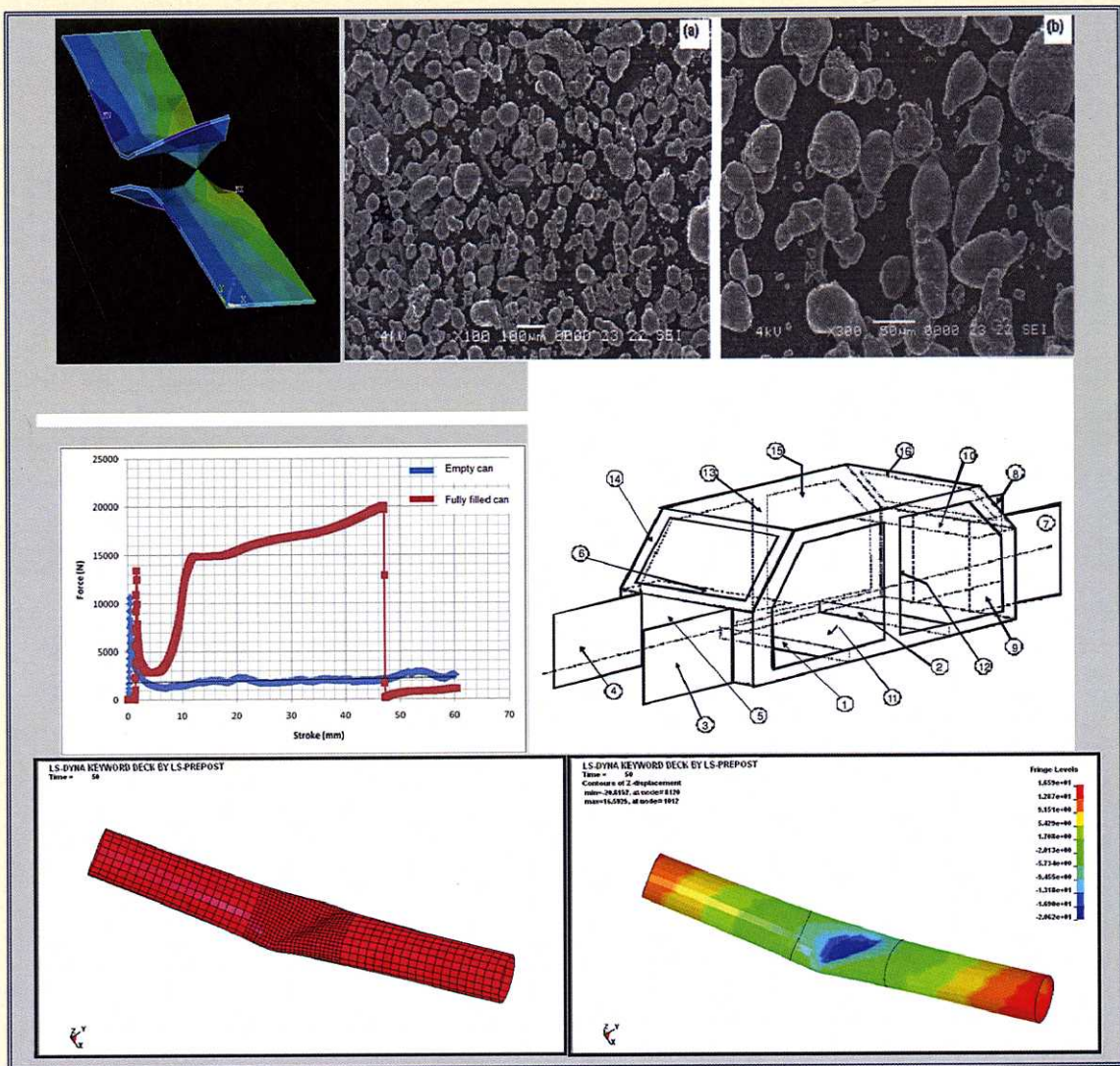


ADVANCED TOPICS IN MECHANICAL BEHAVIOR OF MATERIALS



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Meftah Hrairi



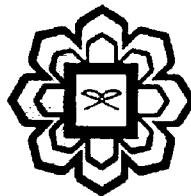
IIUM PRESS

INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

ADVANCED TOPICS IN MECHANICAL BEHAVIOR OF MATERIALS

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Meftah Hrairi



IIUM Press

Published by:
IIUM Press
International Islamic University Malaysia

First Edition, 2011
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Perpustakaan Negara Malaysia

Cataloguing-in-Publication Data

ISBN: 978- 967-418-174-1

Member of Majlis Penerbitan Ilmiah Malaysia – MAPIM
(Malaysian Scholarly Publishing Council)

Printed by :

IIUM PRINTING SDN. BHD.

No. 1, Jalan Industri Batu Caves 1/3

Taman Perindustrian Batu Caves

Batu Caves Centre Point

68100 Batu Caves

Selangor Darul Ehsan

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SIMULATION MODEL OF 3D LIQUID SLOSH IN A PARTAILLY FILLED CYLINDRICAL TANK

Qasim H. Shah, Hasan M. Abid, Adib B. Rosli

1. INTRODUCTION

Most of the previous studies on fluid slosh within tanks have considered two-dimensional (2D) flows [1]. When a tank is excited at a frequency near the resonance, the swirling motion may be induced and superimposed on the normal slosh motion, which cannot be adequately captured by the 2D model. The laboratory experiments performed on a scale model tank will clearly shows the presence of 3D fluid slosh even under excitations along a single axis. Moreover, highway tanks commonly encounter simultaneous excitations along all axes, which would cause 3D slosh. Only a few studies have reported the 3D slosh analysis for very limited parameters. Thus, the 3-D slosh behavior in tanks has not been well understood.

2. MODEL SIMULATION

A 3D slosh model is established using Smoothed Particle Hydrodynamics (SPH) method of LS-DYNA software package. In view of the limitations of the previous studies, the model will be systematically verified for the three dimensional water slosh in a clean bore tank. The validation is extensively performs against the experimental results for various filled of water volume in tank. Majority of the previous slosh analyses have thus been made in the scope of laminar flows. SPH method is an integration scheme which was developed by Lucy [2] and Gingold and Monaghan [3]. It is based on the Lagrangian formulation with the purpose to avoid the mesh restrictions when large deformations appear within the finite element method. The main difference between the standard methods and the SPH is the absence of the mesh, since the SPH formulation is essentially a mesh less method Figure 1.