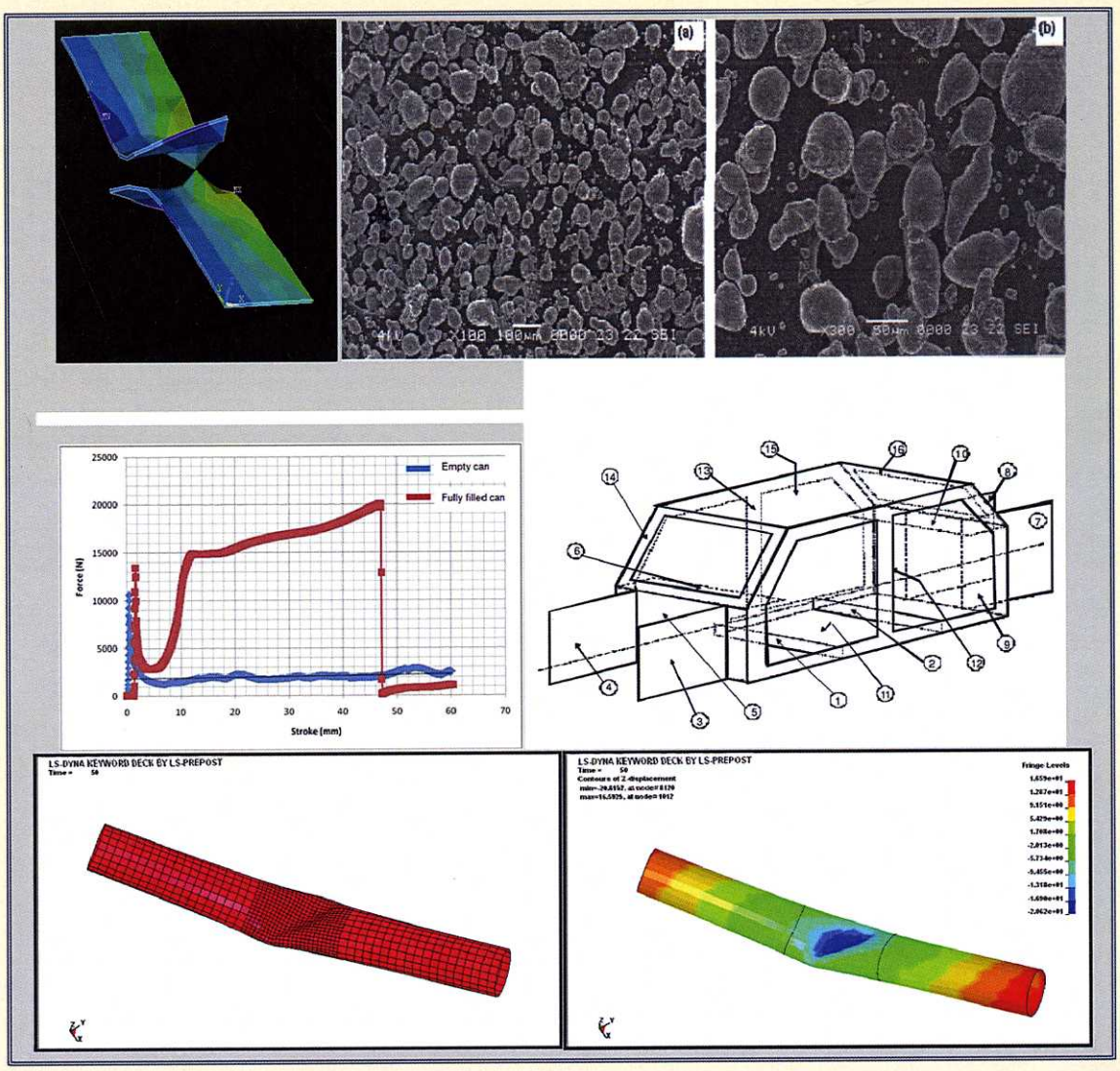
ADVANCED TOPICS IN MECHANICAL BEHAVIOR OF MATERIALS



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Meftah Hrairi

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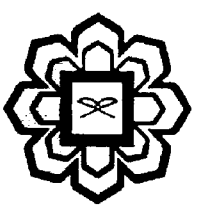

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NUMERICAL AND EXPERIMENTAL RESULTS OF LIQUID SLOSH IN A PARTIALLY FILLED CYLINDRICAL TANK

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

1. INTRODUCTION

Several experiments with different water levels were conducted to monitor the effect of water slosh in the container tank. This experimental study on fluid slosh was conducted to validate the results of the numerical models. The observation of the experimental results shows that strain gage-1 experienced compression strain at the top of the tank, while strain gage-2 experienced tension strain at the frontal area. The unit of the strain is displayed in μm/m. From this experiment, the values for strain gage-1 is quite lower than strain gage-2.This big different is due to strain gage-2 in the frontal area is experience more forces and moments compared to the strain gage-1 at the top of the tank.

Liquid fill level of 75% has the highest average value for both strain gage-1(352.5μm/m) and strain gage-2(2767.5μm/m). Strain gage-2 is 225μm/m. Average values of strain gages were taken in all fill volumes in order to get accurate results for all strains. It can be concluded that in case of un-baffled condition, 3/4 fill-level is the most dangerous case as the strain is highest among all fill levels. Therefore, in actual applications, it is more tolerate to use the half filled (50%) water level for un-baffled case since it gives the moderate values of strains and able to carry more water in the tank compared to 25% fill level although it has lower values of strain.

2. COMPARISON OF STRAIN VALUES FOR 50% AND 75% FILL VOLUME

From the table above, the result shows big percentage errors in certain fill conditions. This is because the SPH method is only good for approximations of the fluid motion, and the results obtained are not accurate as Arbitrary Lagrangian Eulerian formulation (ALE) method. The simulation using SPH method usually gives lower values of strain than in the experiment. From both simulation and experiment,