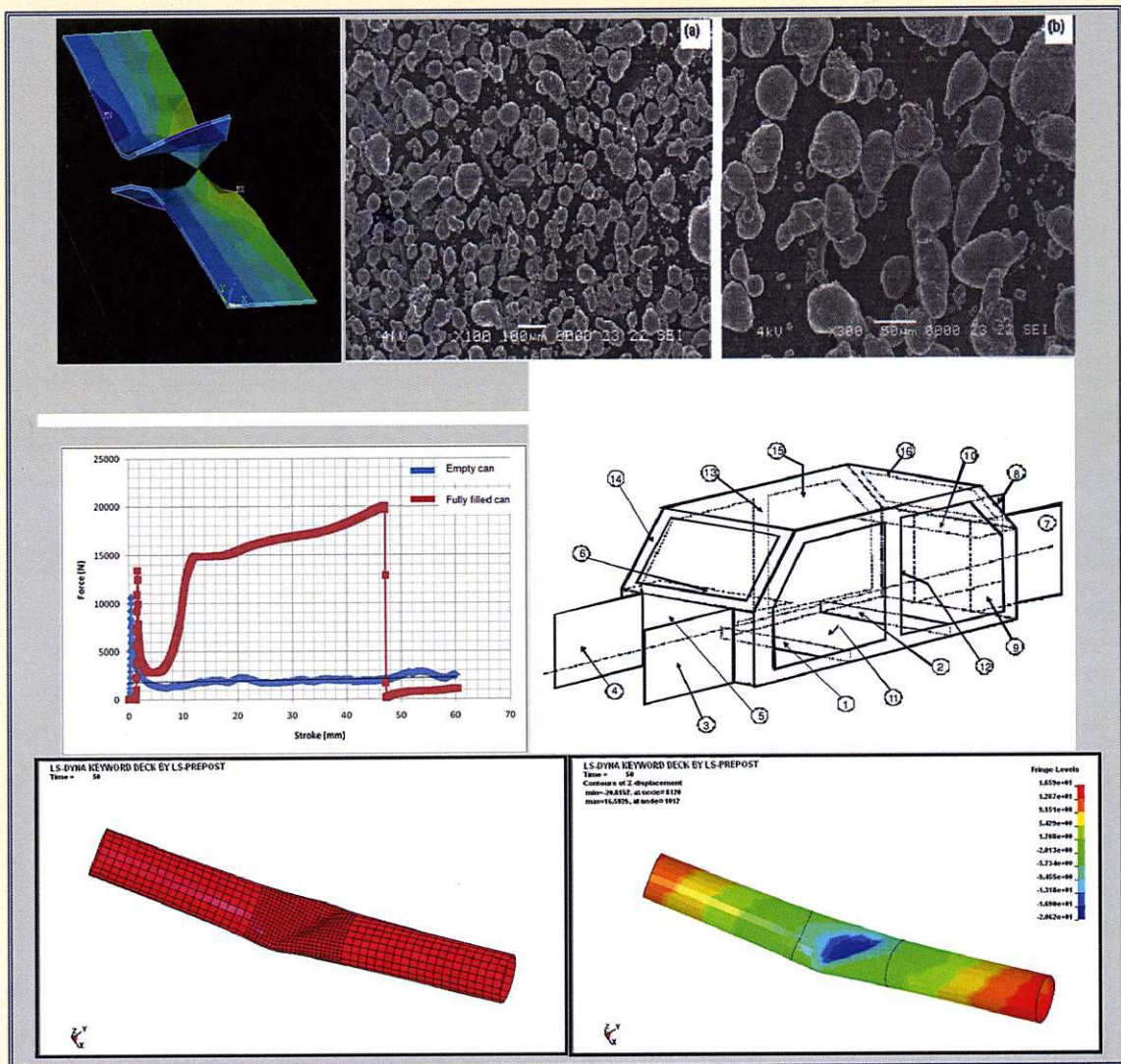


# ADVANCED TOPICS IN MECHANICAL BEHAVIOR OF MATERIALS



Edited by

**Meftah Hrairi**



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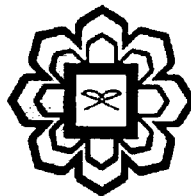
INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

ADVANCED TOPICS IN MECHANICAL BEHAVIOR OF MATERIALS

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Edited by

Meftah Hrairi



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## NUMERICAL ASSESSMENT OF LIQUID FILLED CONTAINER SUBJECTED TO FREE FALL ON RIGID STEEL PLATE

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

### 1. INTRODUCTION

Chemicals can be a great threat to society and the environment, despite its wide usage in industrial applications. Extra precautions have to be taken into account, moreover with increasing number of accident cases involving chemical-transporting tanks. Precautions should be taken especially when transporting chemicals of radioactive nature. Should any spill of such chemicals occur, its effects on the environment and human life can be catastrophic. In terms of passive safety, the tank designer has to study the probable effect on the tank body should the transporter get involved in a crash, thus enhancing the design. Instead of conducting real experiments or tests which requires huge sums of money, computer simulation is an alternative to predict the actual scene. ANSYS and LS-DYNA, two powerful software environments were used to simulate events of nonlinear phenomenon ranging from limited duration impacts, collisions and crashes to more permanent deformations providing an insight into behavioral patterns of materials. To have more realistic environment, the mesh-less Smooth Particle Hydrodynamics (SPH) computation feature, provided by explicit finite element program of LS-DYNA was used in the prediction of particle behavior of liquid (water) in the tank under stress. Besides, the software was used to predict the dent depth and reduction in plate thickness at impact points.