SHIP COLLISION AND GROUNDING PERFORMANCES

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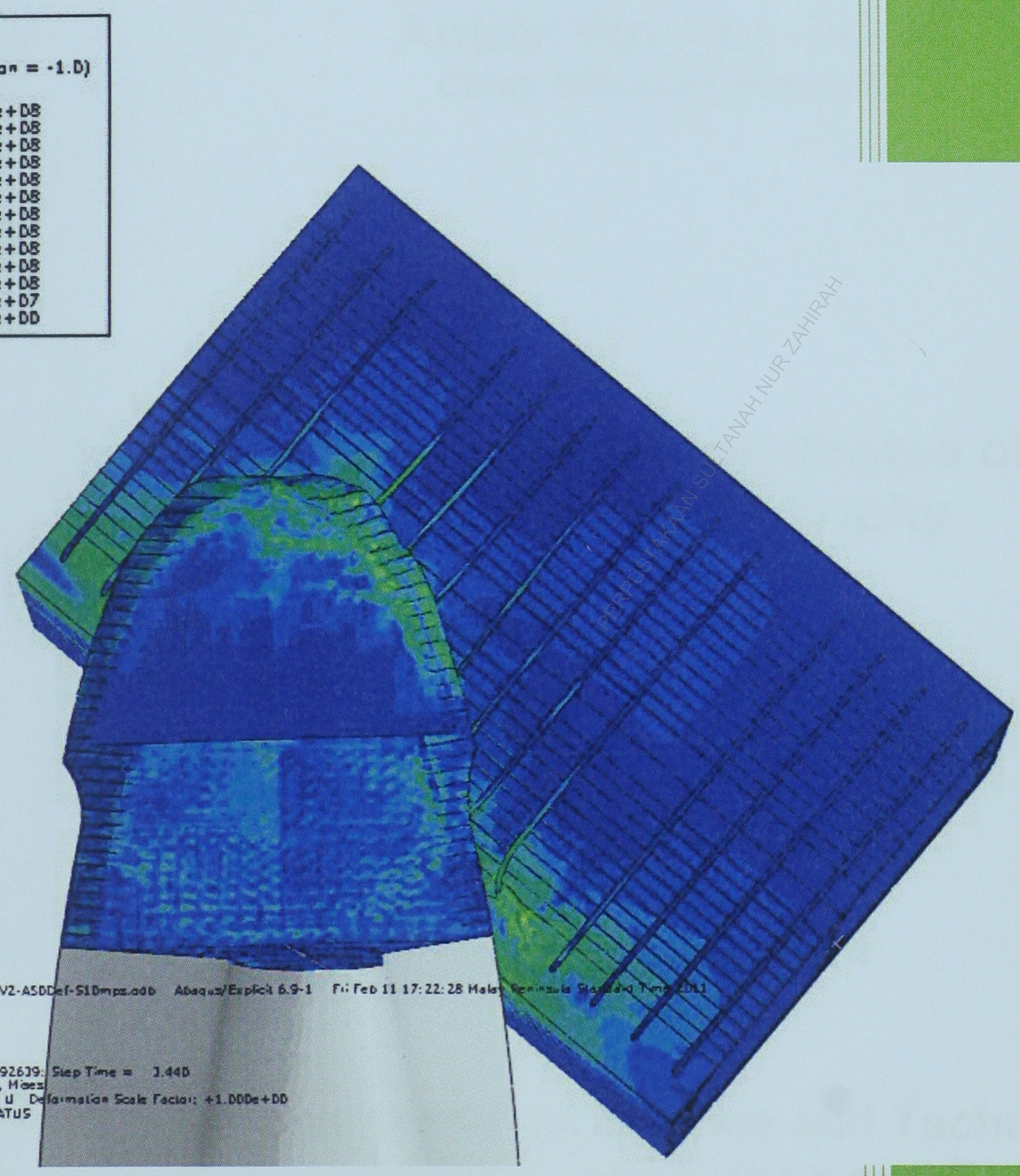

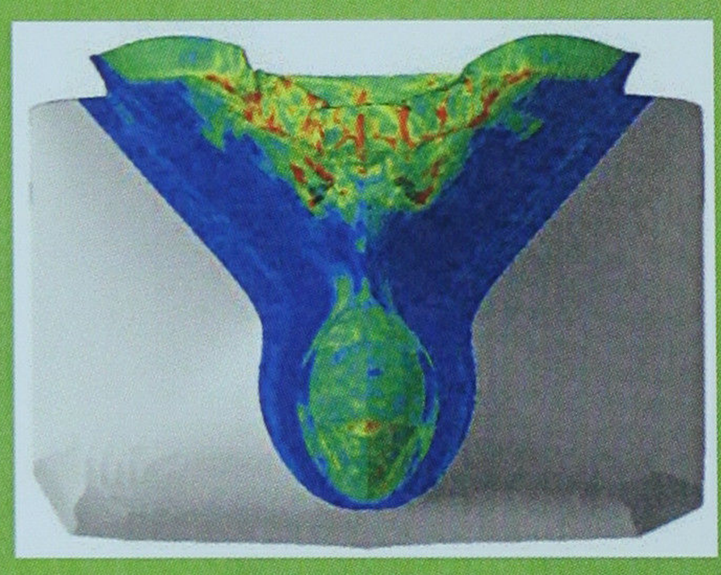

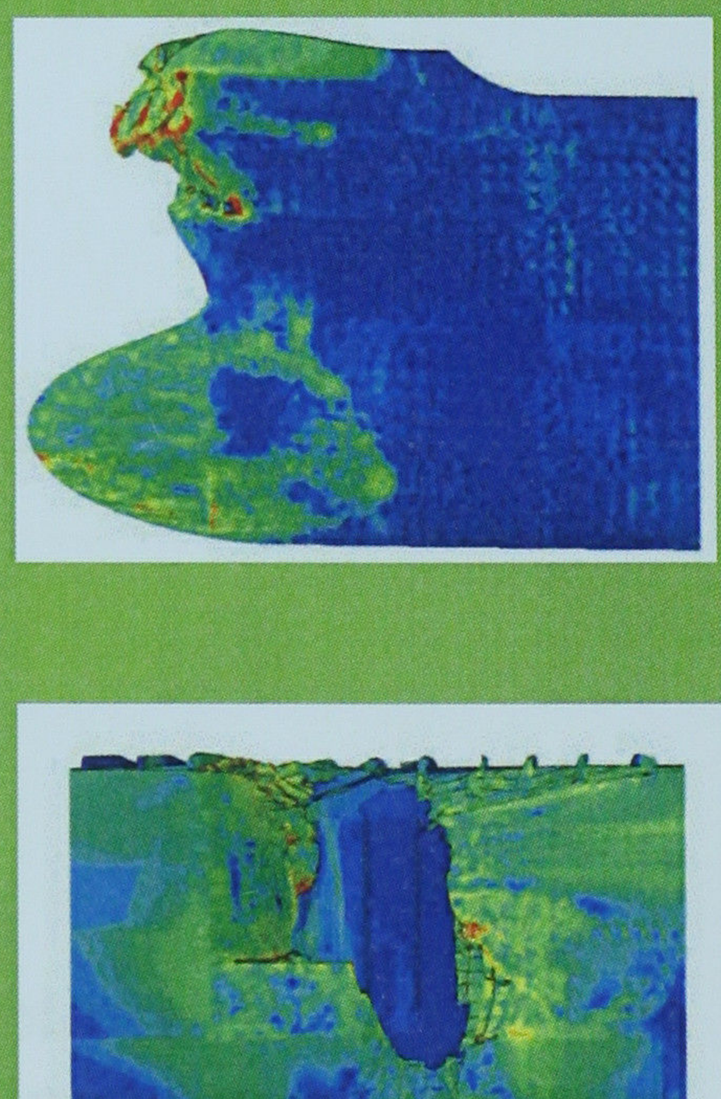

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Abstract

This present thesis investigates the accidental load of ship collision and grounding performances. To achieve this objective the thesis is composed of several main tasks. The main tasks comprise the rupture prediction, validation of material failure, ship grounding analysis and ship collision analysis.

To predict material rupture, FLD material failure was used and validated with available experimental and FEA data. The FLD was extended to established material failure scaling laws which consider onset failure at plane strain in relation to mesh sizes. This was accomplished by running mesh convergence studies at different mesh sizes and at different FLD_0. The linear material damage evolution is adopted in this case until the convergence results were satisfied. The material damage was used for all of further analysis in ship collision and grounding and employed mild steel and high tensile steel material properties. The ship grounding structure damage was investigated by deploying conical rocks at different locations of the ship's double bottom structure. The analysis focused on vertical penetration and horizontal penetration which contributed to significant damage to the structure. The ship collision analysis was investigated in various types of structures arrangement and diverse ship striking scenarios to penetrate struck ship and collide rigid wall.

Furthermore, the prediction of ship collision and grounding were extended by using simplified approaches that were capable to predict ship collision to rigid wall, rigid body striking ship collided with deformable struck ship and deformable collision of striking and struck ship.

Finally, this substantial amount of research work achieved the objectives of the study when the results of accidental load were validated and correlate well with experimental, empirical and FEA simulations at more than a satisfactory level.