



Multiphysics Investigation of Composite Shell Structures Subjected to Water Shock Wave Impact in Petroleum Industry

Objective

- To examine the dynamic failure mechanisms of composite shell structures subjected to water shock impact loading, used in the petroleum industry.

Methodology

- The proposed work consists of experimental studies of composite structures subjected to water shock loading along with theoretical and numerical analyses.
- The mechanical testing will be conducted using the water gun (shock tube). The carbon fibre/epoxy lay-ups will be based on those currently used by the petroleum industry.
- For the numerical part of the study, the finite element software ANSYS/LS-DYNA will be employed with the Chang-Chang failure criteria for composite damage detection.
- The numerical simulation will be modelled using principles of fluid-structure interaction and hence make use of the Arbitrary Lagrange Euler (ALE) formulation and Penalty Coupling method.

Outcome

- This research will provide much needed data on the failure of composite shell structures and validate numerical methodologies essential for use in future work on fluid-structure interactions in the oil and gas industry.

