

Dynamic Underwater Response of Composite Plates to Implosion of Submerged Shells

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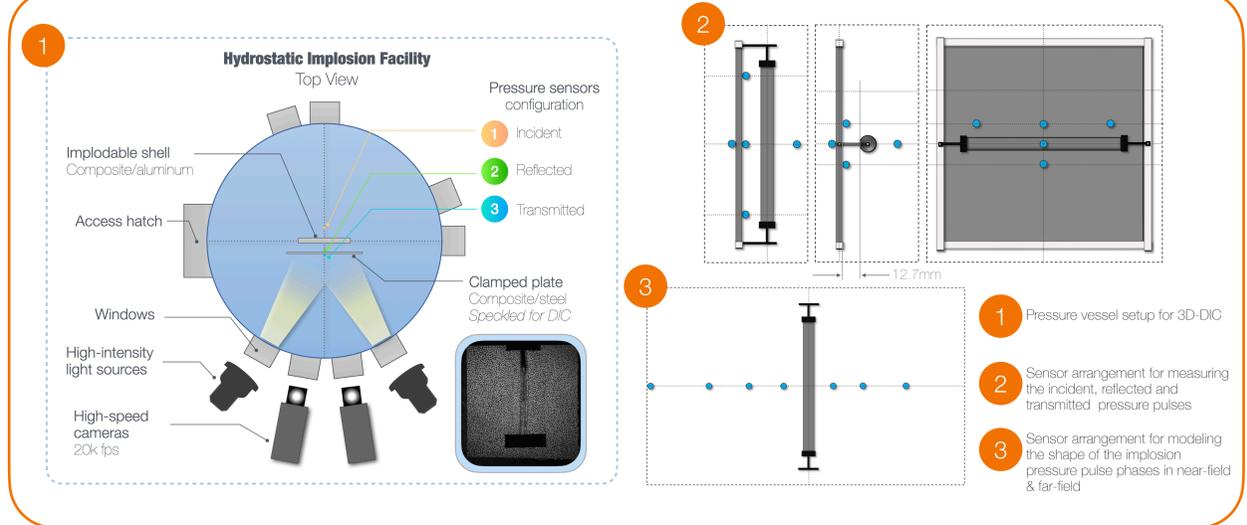
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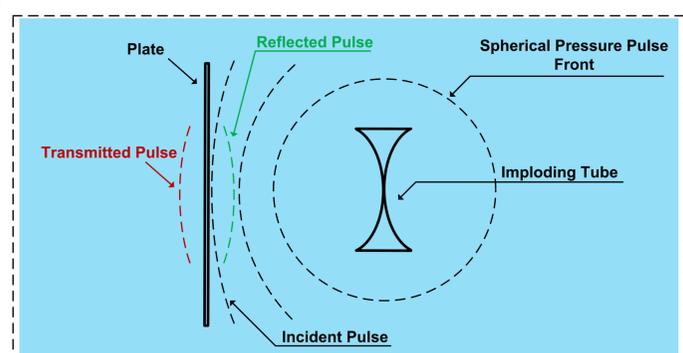
Abstract

The response of a submerged composite plate to a dynamic underwater implosion pressure pulse is investigated experimentally and analytically. The pressure pulse is provided by the implosion of a submerged, cylindrical composite tube positioned in front of the plate. The experiments are conducted in a semi-spherical, large-diameter pressure vessel capable of 3-D Digital Image Correlation (DIC) technique, under hydrostatic pressure. Two different diameter tubes are used for comparison of their implosion's effect on four different composite plate thicknesses. For each case, to see how the plate responds to and interacts with the pressure pulse provided by the composite tube implosion, the incident, reflected and transmitted pressures on and around the plate are measured. An FSI model was developed assuming a cylindrical wave shape of implosion pulse during the under-pressure phase and a spherical pressure pulse during the over-pressure phase. Loading on the plate was modeled as a Gaussian pressure distribution. The FSI model closely predicts the max-deformation response of the plate and also how much pressure is transmitted through it.

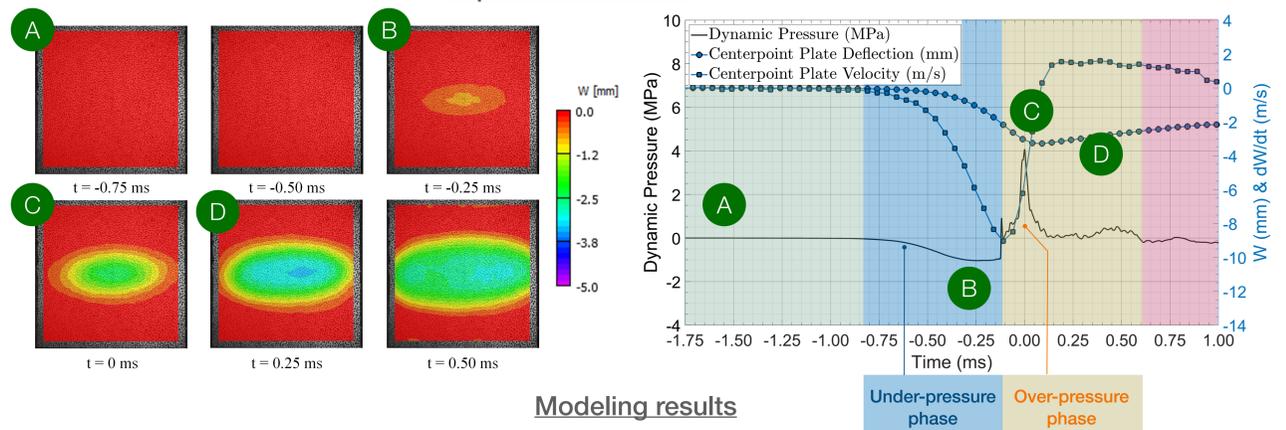
Experimental setup



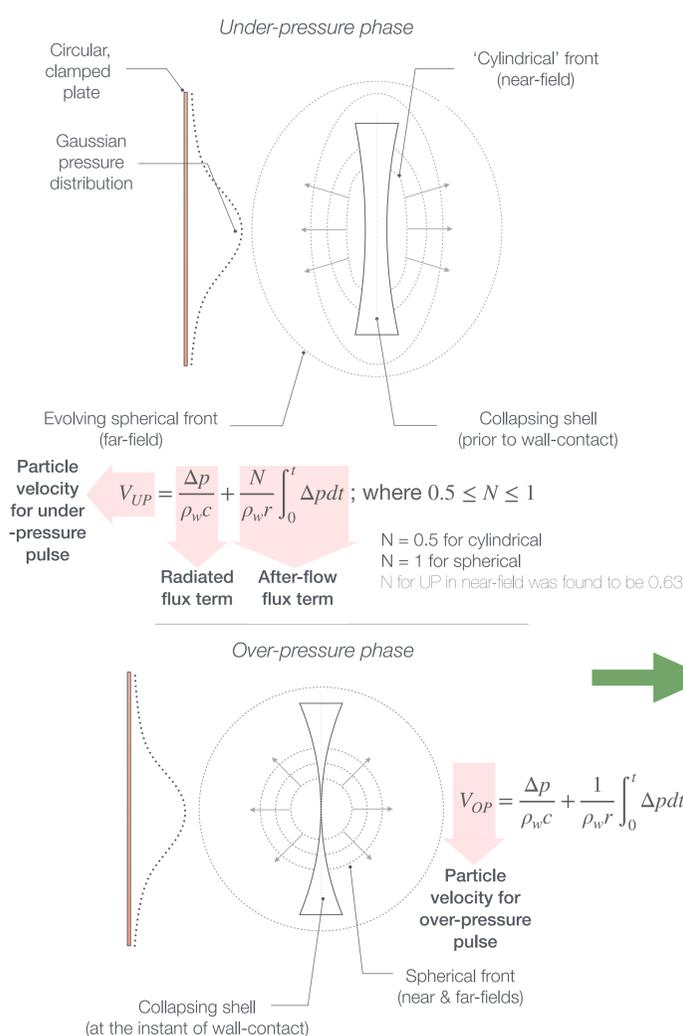
Results & FSI phenomena



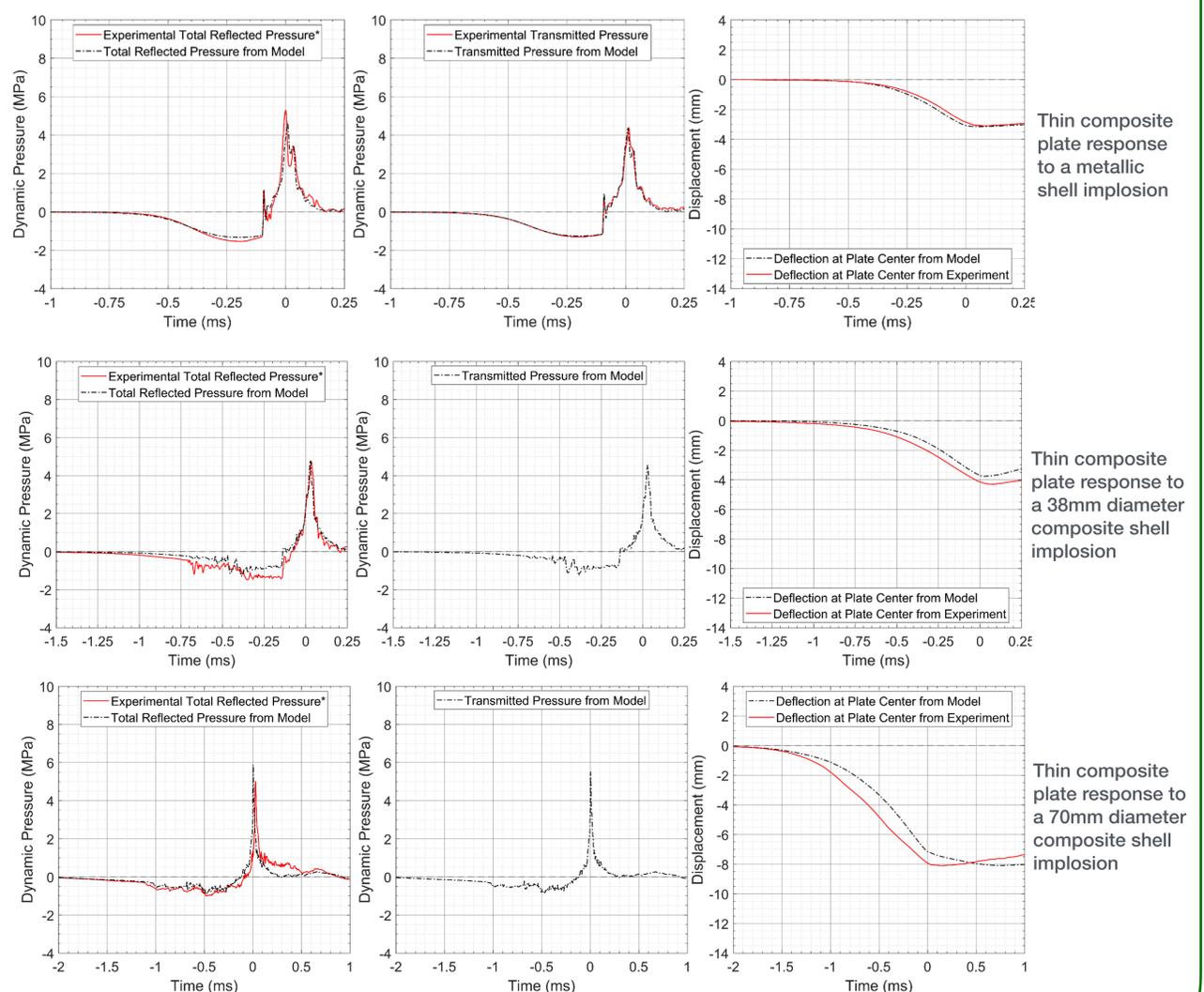
Experimental results



Modeling



Modeling results



Acknowledgements

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