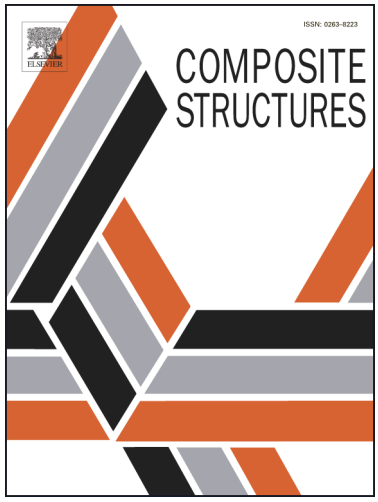

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Near Field Underwater Explosion Response of Polyurea Coated Composite Cylinders

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Abstract

The response of composite cylinders to near field underwater explosive (UNDEX) loading, including the effects of polyurea coatings, have been studied through experiments with corresponding computational simulations. Experiments were conducted on woven E-glass/epoxy roll wrapped cylinders in three unique configurations: (1) base composite, (2) base composite with a thin (100% composite thickness) coating, and (3) base composite with a thick (200% composite thickness) coating. Each cylinder configuration was subjected to near field underwater explosive loading in a large diameter test tank at charge standoff distances of 2.54 cm and 5.08 cm. The response of the cylinders on the non-loaded side was evaluated through high speed photography coupled with three-dimensional Digital Image Correlation (DIC). Transient deformation and Post-mortem damage comparisons were made to evaluate the effects of the applied coatings. The LS-Dyna finite element code has been utilized to conduct corresponding computational simulations of the experiments to allow for additional evaluations of the cylinder response. The simulations are shown to provide high correlation to the experiments in terms of pressure loading and final damage mechanisms. Results for the internal / kinetic energy levels and the material strains as determined through the simulations are presented. The experimental