EXPERIMENTAL EVALUATION OF STRUCTURAL COMPOSITES FOR BLAST RESISTANT DESIGN

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ABSTRACT

Structural panels comprised of honeycomb fiber reinforced polymer (FRP) laminations were evaluated under blast and fragmentation to examine their value as quickly maneuverable prefabricated structures. The structural panels were evaluated in three test configurations: first as wall panels subjected to blast only, second as overhead protection roof panels subjected to blast, and third as protective wall panels subjected to fragmentation from nearby detonation of a mortar. Four wall panels were tested in this study, each with a different thickness and inner core configuration, under blast loading. Another four wall panels were tested under fragmentation loading. Two panels of similar core configuration but different overall thicknesses were evaluated during the overhead protection roof panel experiment. Static resistance functions were developed using a combination of analytical and laboratory testing in order to obtain the panels response using a single-degree of freedom (SDOF) dynamic analysis. Engineering analytical models were able to predict the panels responses under live explosive blast testing. The roof panels provided a significant level of protection under blast loading, but the wall panels subjected to blast and fragmentation effects did not perform as desired. Additional evaluation and optimization of the roof panels is deemed necessary to fully determine their potential use for maneuverable prefabricated structures.