RESPONSE OF STEEL-CONCRETE SANDWICH TARGETS TO HYPERVELOCITY IMPACTS BY EXPLOSIVELY FORMED PROJECTILES

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Explosively formed projectiles (EFPs) is one of the most severe explosive and impact loading threats for civil infrastructure. Currently, there is no effective means of protection of infrastructure facilities from the EFPs. This study presents the experimental results of the hypervelocity impact of EFPs on steel-concrete (SC) sandwich block targets. The SC blocks tested were representative of the type of protective SC elements for expedient construction of barriers for mitigating IED and EFP threats to critical infrastructure facilities. Response of "non-composite", "partially-composite" and "fully composite" blocks was studied. Even though all the SC sandwich targets were destroyed by the EFPs, one of the important findings of this work is that the SC sandwich elements are capable of terminating the EFPs and providing an effective protection against an EFP threat. The data gathered from these tests is also intended to further the understanding of impacts on SC protective structures at speeds greater than 1000 m/s and for calibration of numerical models of the EFP formation and interaction with steel-concrete targets. 2D and 3D numerical simulations were performed to better understand various stages of the EFP formation and the interaction between the formed slug and the SC sandwich targets. No previously published results on the EFP resistance of SC sandwich structures have been found in the open literature.