REINFORCED CONCRETE PANELS RETROFITTED WITH FIBRE REINFORCED POLYMERS AND SUBJECTED TO NEAR-FIELD BLAST AND FRAGMENTATION EFFECTS

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Key words : Fibre Reinforced Polymer – Near-Field – Blast – Fragments – Numerical simulation

The use of fibre reinforced polymers (FRP) to enhance the static load carrying capacities of existing reinforced concrete (RC) structures is widely accepted. Its use is favoured for its excellent physical properties and ease of application. In recent years, the use of FRP to strengthen structures against far field blast loading had grown rapidly due to the cost effectiveness in the application to both new and existing facilities. There is potential to extend usage to fragment shields, or backing plates, to contain spalling which result from high-intensity, close-in explosions. However, knowledge in this field is limited and, in addition to blast loads, there is value to develop a methodology for the design of FRP to resist fragmentation loads. As such, a systematic research programme was conceived to bridge these knowledge gaps. This paper will outline the planned synergistic efforts in analytical, numerical and experimental components of the study. In addition to experiments which subjected RC panels retrofitted with FRP to cased munitions at close-in standoff distances, laboratory material tests were conducted to understand holistically the response in both material and structural levels. Preliminary analysis of the results from structural tests indicated that RC panels retrofitted with FRP sustain significantly less local damage, especially on the distal face. In terms of the failure mode, the assumed numerical modelling approach showed good potential to serve as a platform to consolidate data from both material and structural tests, and to aid in developing a design methodology for RC structures retrofitted with FRP against close in blast and fragmentation loads.