PRE-TEST STUDY OF FRP-STRENGTHENED PRECAST RC COLUMN JOINT AGAINST CLOSE-IN DETONATION

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Abstract. *Traditionally, blast resistance buildings have been constructed from cast-in-place reinforced concrete components such as column, beam, wall, and slab. The cross sections at the connections are monolithic and designed with adequate strength to resist direct and diagonal tension shear forces to resist blast loadings. Precast RC elements are prefabricated in factories and assembled onsite with various connections, e.g., in-situ wet connections, mechanical connections such as grouted sleeves connections and bolted connections with grouting. As the joints are non-monolithic and lacks continuity, when precast structures experiences critical scenarios in extreme events such as blast attacks, the joint connection between the elements are considered often as the weakest point and thus the most critical part of precast concrete structures.*

In the past few decades, substantial research has been conducted on strengthening of deficient monolithic RC column joints using different technics such as steel jackets, and fibre-reinforced polymers sheet etc. However, strengthening of precast connection is limited in present literatures. In this study, two pre-test models using high-fidelity-physics-based (HFPB) finite element method to examine the performance of precast RC column joint strengthened with and without FRP against close-in detonation were conducted. The precast RC column without FRP strengthening is served as control for comparing the performance against blast. The purpose of the study is to estimate the effectiveness of FRP composite strengthened at the precast RC column joint connection and provide prediction results before an actual blast experiment test.