

Thesis title:

Numerical Modelling and Experimental Investigation on Enhancing Punching Shear Capacity Using Carbon Fiber Reinforced Polymer on Flat Slabs

Abstract:

Flat slabs are much vulnerable to shear failures because stress transferring between the column and the slab happens within a considerable small region. This creates high stress at the slab-column connection area result in punching shear failure. Therefore, giving adequate shear capacity for the flat slabs is crucial. Carbon Fiber Reinforced Polymers (CFRP) was used for structural strengthening. Use of CFRP is promoted by its competitive advantages over other retrofiting materials. Installation of CFRP flexural reinforcements and post installed CFRP shear reinforcements to enhance punching shear capacity are successful approaches. In this study, medium scale flat slab panels were prepared and strengthened with CFRP. A numerical investigation was also conducted to analyse bond and stress behaviour. The model predicted performances were in good agreement with the test results. The parametric study conducted in ABAQUS showed that use of multi-layered CFRP as external reinforcement was more effective. Further, the identification of the critical locations for the application of the external CFRP strengthening scheme was determined and the practical importance of providing end anchorage was quantified.