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Punching Shear Strengthening of Reinforced Concrete Flat Slabs Using Internal Square Patches of Carbon Fiber Reinforced Polymer

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Abstract : This research presents a strengthening technique for enhancing the punching shear resistance of concrete flat slabs. Internal square patches of CFRP were centrally installed inside 450*450mm concrete panels during casting at a chosen distance from the tension face to produce six simply supported samples. The dimensions of those patches ranged from 50*50mm to 360*360mm. All the examined slabs contained the same amount of tensile reinforcement, had identical dimensions, were designed according to the American Concrete Institute code (ACI) and tested to failure. Compared to the control unstrengthened spacemen, all the strengthened slabs have shown an enhancement in punching capacity and stiffness. This enhancement has been found to be proportional to the area of the installed CFRP patches. In addition to the reasonably enhanced stiffness and punching shear, this strengthening technique can change the slab failure mode from shear to flexural.

Keywords : CFRP patches, Flat slabs, Flexural, Stiffness, Punching shear
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