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Parametric Study on the Behavior of Reinforced Concrete Continuous Beams Flexurally Strengthened with FRP Plates

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Abstract : External bonding of fiber reinforced polymer (FRP) plates to reinforced concrete (RC) beams is an effective technique for flexural strengthening. This paper presents an analytical parametric study on the behavior of RC continuous beams flexurally strengthened with externally bonded FRP plates on the upper and lower fibers, conducted using simple uniaxial nonlinear finite element model (UNFEM). UNFEM is able to estimate the load-carrying capacity, different failure modes and the interfacial stresses of RC continuous beams flexurally strengthened with externally bonded FRP plates on the upper and lower fibers. The study investigated the effect of five key parameters on the behavior and moment redistribution of FRP-reinforced continuous beams. The investigated parameters were the length of the FRP plate, the width and the thickness of the FRP plate, the ratio between the area of the FRP plate to the concrete area, the cohesive shear strength of the adhesive layer, and the concrete compressive strength. The investigation resulted in a number of important conclusions reflecting the effects of the studied parameters on the behavior of RC continuous beams flexurally strengthened with externally bonded FRP plates.

Keywords : continuous beams, parametric study, finite element, fiber reinforced polymer
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