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Long-term Behavior of Fiber-reinforced-polymer-plated Concrete Beams under Sustained Loading: Analytical and Experimental Study

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Abstract: Long-term behavior, deformation recovery, and residual strength of fiber-reinforced polymer (FRP)-plated beams were evaluated. Three concrete beams were fabricated: one control, one carbon-FRP (CFRP)-plated, and one glass-FRP (GFRP)-plated. All beams sustained constant loads for 550 days and were then unloaded for 60 subsequent days to evaluate the deformation recovery performances. During this period, the strains of the FRP plates and internal reinforcing steels, cracks, and deflections were recorded for comparison. Several analytical methods predicted the long-term strains and deflections of the FRP-plated beams. The validity and accuracy of the methods were obtained by comparing the analytical and experimental results.

Keywords: Sustained load, Concrete beam, FRP, Analytical method, Long-term

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