

Effect of the Concrete Cover on the Bond Strength of the FRP Wrapped and Non-Wrapped Reinforced Concrete Beam with Lap Splice under Uni-Direction Cyclic Loading

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Abstract : Many of the reinforced concrete structures subject to cyclic load constructed before the modern bond and fatigue design code. One of the main issue face on exists structure is the bond strength of the longitudinal steel bar and the surrounding concrete. A lap splice is a common connection method to transfer the force between the steel rebar in a reinforced concrete member. Usually, the lap splice is the weak connection on the bond strength. Fatigue flexural loading imposes severe demands on the strength and ductility of the lap splice region in reinforced concrete structures and can lead to a brittle and sudden failure of the member. This paper investigates the effect of different concrete covers on the fatigue bond strength of reinforcing concrete beams containing a lap splice under a fatigue loads. It includes tests of thirty-seven beams divided into three groups. Each group has beams with 30 mm and 50 mm clear side and bottom concrete covers. The variables that were addressed where the concrete cover, the presence or absence of CFRP or GFRP sheet wrapping, the type of loading (monotonic or fatigue) and the fatigue load ranges. The test results showed that an increase in the concrete cover led to an increase in the bond strength under both monotonic and fatigue loading for both the unwrapped and wrapped beams. Also, the FRP sheets increased both the fatigue strength and the ductility for both the 30 mm and the 50 mm concrete covers.

Keywords : bond strength, fatigue, Lap splice, FRp wrapping

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