

Effect of Different FRP Wrapping and Thickness of Concrete Cover on Fatigue Bond Strength of Spliced Concrete Beam

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Abstract : This paper presents results of an ongoing research program at University of Waterloo to study the effect of external FRP sheet wrap confinement along a lap splice of reinforced concrete (RC) beams on their fatigue bond strength. Fatigue loading of RC beams containing a lap splice resulted in an increase in the number and width of cracks, an increase in deflection and a decrease of the bond strength between the steel rebar and the surrounding concrete. The phase of the research described here consists of monotonic and fatigue tests of thirty two reinforced concrete beam with dimensions 2200×350×250 mm. Each beam was reinforced with two 20M bars lap spliced in the constant moment region of the tension zone and two 10M bars in the compression zone outside the constant moment region. The test variables were the presence or absence of a FRP wrapping, the type of the FRP wrapping (GFRP or CFRP), the type of loading and the fatigue load range. The test results for monotonic loading showed that the stiffness of all beams was almost same, but that the FRP sheet wrapping increased the bond strength and the deflection at ultimate load. All beams tested under fatigue loading failed by a bond failure except one CFRP wrapped beam that failed by fatigue of the main reinforcement. The FRP sheet increased the bond strength for all specimens under fatigue loading.

Keywords : lap splice, bond strength, fatigue loading, FRP

Conference Title : ICCEE 2015 : International Conference on Civil and Environmental Engineering

Conference Location : Istanbul, Türkiye

Conference Dates : October 26-27, 2015