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A DAMAGE MODEL FOR HIGH-CYCLE FATIGUE BEHAVIOR OF BOND BETWEEN FRP BAR AND CONCRETE

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Abstract:

A damage-based model was developed for the bond behavior between fiber-reinforced-polymer (FRP) bar and concrete under high-cycle fatigue loading. The high-cycle fatigue nonlinearity is simulated using two separate damage parameters for reproducing the bond stiffness degradation and residual slip growth. The developed damage model was combined with a 'cycle jump' technique to reduce the computational time based on selecting a set of loading cycles. The model was implemented in a 3D finite-element (FE) code, with the aim of simulating the relevant experimental pullout tests. The sensitivity of the fatigue model to the damage parameters and its good predictive performance were demonstrated.

Keywords: High cycle fatigue; Interface; Polymer matrix composites; Reinforced concrete; Finite Elements.

1 Introduction

Fiber reinforced polymer (FRP) reinforcement is one of the most recent type of composite materials for the reinforcing and strengthening purposes of reinforced concrete (RC) structures due to the several advantages offering by the FRP composites [1-4]. One of these