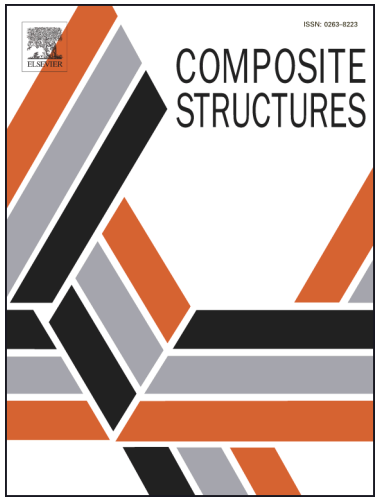

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Effect of Engineered Cementitious Composite on the Bond Behavior between Fiber-Reinforced Polymer and Concrete

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Abstract: Externally bonded fiber-reinforced polymer (FRP) to a degraded reinforced concrete structure is currently a very popular strengthening technology; however, premature debonding mainly caused by concrete crack propagation leads to the underutilization of FRP. Engineered cementitious composite (ECC) has an excellent crack control capability. When used in combination with FRP, ECC can effectively delay the debonding of FRP and enhance the bearing capacity and ductility of FRP-strengthened structures. For the safe and economic strengthening design, the bond-slip relationship of FRP-ECC-concrete needs to be properly understood. This paper investigated the bond behavior of FRP–ECC–concrete interface through a series of simple shear tests. The effects of ECC thickness, concrete surface treatment, and construction method on the bond behavior were evaluated. The deformation and strain data of FRP were collected and analyzed using a noncontact full-field strain measurement system VIC-3D (three-dimensional video image correlation system). The experimental results show that the addition of an ECC layer delayed the debonding of FRP and significantly increased the maximum strain of FRP. The bearing capacity, the ultimate slip, and the interface energy consumption capacity also improved