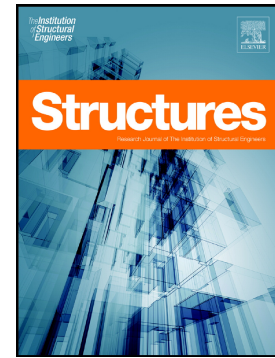


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Fiber Reinforced Polymer as External Reinforcement for Single Cast-in Anchors in Plastic Hinge Zones

Jian Zhao^{1*}, Derek Petersen², Zhibin Lin³, and Baolin Wan⁴

ABSTRACT: This paper presents a test of cast-in anchors in the plastic hinge zone of a reinforced concrete column. Design codes, such as ACI 318-11, do not allow concrete anchors in concrete that could be substantially damaged during an earthquake unless special reinforcement is provided. Steel reinforcement has been proven effective in protecting core concrete; however, it does not protect cover concrete, which is critical to the shear behavior of anchors. Fiber reinforced polymer (FRP) composite material was used in this study to protect cover concrete around the test anchors. The column specimens were subjected to quasi-static cyclic loading while the single anchors were loaded in cyclic shear. Compared with the anchors in unprotected concrete, the FRP reinforced anchors developed a higher shear capacity at a much smaller displacement. This indicates that FRP fabrics can be effective as external reinforcement for concrete anchors. Meanwhile, a systematic study is needed before practical applications.

Subject headings: cast-in anchors; carbon fiber; fiber reinforced polymer (FRP); plastic hinge zone; reinforced concrete; and seismic design.

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