SHEAR PERFORMANCE OF REINFORCED CONCRETE BEAMS STRENGTHENED WITH AN INNOVATIVE EMBEDDED THROUGH-SECTION SYSTEM

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Abstract

Embedded through-section (ETS) technique is one of the modern strengthening techniques for enhancing shear performance of reinforced concrete (RC) structures. This study investigates the shear behavior of RC beams strengthened with glass fiber-reinforced polymer (GFRP) bars using an innovative ETS retrofit system. An experimental program including three ETS-strengthened beams and one reference beam was carried out. The crucial factors considering in the experiment consist of the presence of anchorage system and the two types of mechanical anchorages: steel and GFRP anchoring nuts. The shear strengths of the EST-strengthened beams calculated by the existing shear resisting models are validated against the shear strengths measured from the tests. The results obtained from the study demonstrate that the beam strengthened with ETS GFRP bars incorporating the GFRP anchoring nuts provide the great shear performance. To achieve the indispensable accuracy, the study indicates that the available shear strength models for prediction of shear contribution of the anchored ETS bars in the beams should be further developed.

Keywords: *Embedded through-section, Glass fiber-reinforced polymer, Shear strengthening, Reinforced concrete, Shear strength model*