CONTRIBUTION OF SHEAR TRANSFER MECHANISMS AND STRENGTH OF GFRP REINFORCED CONCRETE BEAMS

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Abstract: This work aims to discuss the shear behavior and strength of concrete beams internally reinforced with glass-fiber reinforced polymer (GFRP) longitudinal bars, with and without stirrups. The partial results of an ongoing experimental program intending to investigate the crack kinematics and contribution of different shear transfer mechanisms to the final strength are presented. The test results for two dowel specimens, four push-off specimens and six beams subjected to four-point bending are reported. Digital image correlation (DIC) was used to gather information about crack opening and sliding throughout the tests and the measured kinematics were used as inputs in theoretical models. The approach was validated with the experimental results and was used to quantify the participation of each shear mechanism. It is shown that the contribution of aggregate interlock gradually reduces as the crack opens, whereas participation of stirrups linearly increases up to failure.

Keywords: GFRP reinforced concrete, Shear transfer mechanisms, Shear strength, Digital image correlation.