

Refining the torsion design of fibered concrete beams reinforced with FRP using multi-variable non-linear regression analysis for experimental results

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Abstract

There is very little guidance for practitioners regarding the torsion design of fiber-reinforced polymer (FRP) and hybrid reinforced concrete beams, especially those with fibered concrete (FC). The purpose of this study is to improve the handful of methods used for predicting the torsion cracking and ultimate strength of reinforced concrete (RC) beams with FRP reinforcements. An experimental database of 46 RC beams with FRP or hybrid reinforcements and tested under torsion were compiled from seven different studies. Two proposed models (PM1 and PM2) based on the existing torsional model for FRP reinforced concrete beams and calibrated to fit the experimental data using multilinear non-linear regression. The cracking and ultimate torque predicted using the proposed models are more accurate compared with that calculated using selected ones existing in the literature. The PM1 is consistent with the existing design codes, yet more accurate compared to them. While the PM2 is non-iterative yet capture the actual variation of the strength with the effective parameters.

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