

Lecture Notes in Civil Engineering

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Performance of RC Beams Using CFRP, GFRP, and SSWM Subjected to Torsion: Numerical Study



Saloni V. Bhavsar, Sunil D. Raiyani, and Paresh V. Patel

Abstract The research on flexure, shear, and axial strengthening of reinforced concrete (RC) members has been conducted many times, but very few studies have been carried out on torsional strengthening of RC members. The main objective of the present study is to ascertain the better strengthening material in terms of torsional strength and damage patterns. A finite element (FE) study is carried out using ABAQUS software to understand the behavior of RC beam strengthened using different fiber reinforced polymers (FRPs), i.e., carbon fiber reinforced polymer (CFRP), glass fiber reinforced polymer (GFRP), and stainless-steel wire mesh (SSWM). Total sixteen beams are adopted from literature. One beam is kept as a control beam, while the other fifteen beams are strengthened using CFRP, GFRP, and SSWM with five different wrapping configurations. Torque-twist response, ultimate torque and corresponding twist, damage pattern, and maximum principal strain are measured and compared with experimental results from the literature. The study reveals that the effectiveness of SSWM as a strengthening material is as good as CFRP and GFRP in terms of torsional strength, failure pattern, and maximum principal strain.

Keywords Reinforced concrete beam · Glass fiber reinforced polymer · Stainless steel wired mess · Carbon fibre reinforced polymer

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