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Nonlinear Analysis of Torsionally Loaded Steel Fibred Self-Compacted Concrete Beams Reinforced by GFRP Bars

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Abstract : This paper investigates analytically the torsion behavior of steel fibered high strength self compacting concrete beams reinforced by GFRP bars. Nonlinear finite element analysis on 12 beams specimens was achieved by using ANSYS software. The nonlinear finite element analysis program ANSYS is utilized owing to its capabilities to predict either the response of reinforced concrete beams in the post elastic range or the ultimate strength of a reinforced concrete beams produced from steel fiber reinforced self compacting concrete (SFRSCC) and reinforced by GFRP bars. A general description of the finite element method, theoretical modeling of concrete and reinforcement are presented. In order to verify the analytical model used in this research using test results of the experimental data, the finite element analysis were performed. Then, a parametric study of the effect ratio of volume fraction of steel fibers in ordinary strength concrete, the effect ratio of volume fraction of steel fibers in high strength concrete, and the type of reinforcement of stirrups were investigated. A comparison between the experimental results and those predicted by the existing models are presented. Results and conclusions thyat may be useful for designers have been raised and represented.

Keywords : nonlinear analysis, torsionally loaded, self compacting concrete, steel fiber reinforced self compacting concrete (SFRSCC), GFRP bars and sheets
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