FINITE ELEMENT ANALYSIS OF SELF-COMPACTING REINFORCED CONCRETE BEAMS IN SHEAR

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ABSTRACT

With the advent of soft computing and superior technology, in-depth analysis of certain parameters for structural elements has become the need of hour. Finite Element Method is an effectual tool which serves for the purpose of computing parameters like displacement and load etc at very tiny mesh size even in millimeters. The in-depth shear response analysis with varying longitudinal reinforcement of beams requires load at first crack, ultimate load, load value as well as displacement value at each interval in millimeters. ATENA software based on principle of Finite Element Method can serve for the purpose, as the literature concludes. The current research work is based on Finite Element Method using ATENA, in which shear response of normal and Self-Compacting Concrete are compared. The percentage of main steel is varied as 0.5, 1.0, 2.0, 3.0 % in 6 specimen picked from the literature. Further shear span to depth ratio (a/d) variation of 1.5, 2.5, 3.5 is applied to each specimen. A total analysis of 12 beams is done using ATENA for shear response of normal concrete. The comparison of these 12 beams is done with another 12 beams of Self – Compacting Concrete. A total of 24 beams are analyzed for shear behavior. The ATENA results are in good agreement with the experimental results. As per ATENA results, shear strength increases with an increment of main steel percentage and with decrement in a/d ratio which is as per literature findings. Beams with smaller a/d ratio with 0.5% main steel displayed ductile behavior and beams at 2 and 3 %, fails suddenly. ATENA results are thus acceptable and the conclusions of this research work demonstrate it.