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Praveen Kannam, Venkateswara Rao. Sarella

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Praveen Kannam[1*], Venkateswara Rao. Sarella[2]

[1]Research Scholar, Department of Civil Engineering, National Institute of Technology, Warangal, India.

[2]Associate Professor, Department of Civil Engineering, National Institute of Technology, Warangal, India

Abstract:

Shear failure in reinforced concrete is sudden and brittle; to avoid this type of failure, beams are reinforced with stirrups. The present work is aimed at studying the shear behaviour of fiber reinforced self-compacting concrete and comparing the experimental results with a finite element model created using ATENA. ATENA is a user-friendly software developed for nonlinear analysis of reinforced concrete structures. In the experimental study, two grades of self-compacting concrete (SCC30 and SCC70) were considered. A total of 16 shear deficient beams were cast and tested for two shear span to depth ratios (a/d) of 2 and 3 for both fibrous and non-fibrous concrete. The 16 beams were also modelled using the nonlinear numerical based ATENA software. The experimental results demonstrated that, as the shear span to effective depth ratio increased from 2 to 3, the ultimate shear strength decreased, and with addition of steel fibers there is an improvement in the ultimate load carrying capacity of SCC beams. There is an enhancement in the shear behaviour. It was also noticed that, due to the addition of steel fibers, the sudden brittle failure mode of the beams changed to a ductile mode. The experimental results compared well with numerical values obtained from the finite element software (ATENA), with the percentage error in most cases being less than 15%.

Keywords*: Self-compacting concrete, ATENA, Ultimate shear strength, Enhancement.*