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Parametric study of steel fiber reinforced concrete members subjected to shear, bending and torsion

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An attempt is made in this experimental study, the effects of the fly ash and steel fibers on compressive, split tensile, shear, flexural, and torsional strength of high strength plain and steel fiber reinforced concrete beam specimens. In this program, 99 cubes and 18-cylinder samples are cast for a trial mix design. The trial mixes are with different percentages of fly ash and steel fibers. The concrete mixes have 10%, 20%, and 30% of fly ash by replacing cement to its weight and 0%, 0.5%, 1%, 1.5%, 2.0% and 2.5% of steel fibers by the weight of cement concrete. The compressive strength of the steel fiber reinforced concrete (SFRC) reaches the maximum at 20% fly ash and 1.5% volume fractions of steel fiber. The splitting tensile strength and the modulus of rupture improve with an increasing volume fraction. To study flexural strength behavior, a total number of 60 beam specimens of size 150 x 150 x 1500 mm are cast. 12 beam specimens without pre-stressed and 24 beam specimens with pre-stressed by adding 20% fly ash and 1.5% steel fiber and 12 beam specimens without and 12 beam specimens with pre-stressed casting with plain concrete by adding 20% fly ash. A primary finding emerging from the experimental program is that the placement of steel fibers increased the load carrying capacity of SFRC beam specimen. Also, it enhanced ductility, modulus of elasticity (E_c), shear modulus (G), Poisson's ratio (μ), torsional stiffness of concrete (K_t), energy absorption, shear, flexural, and torsional shear strength.

Biography

Sudhir P Patil has completed his PhD from Mumbai University, India. He is an Associate Professor in the Department of Applied Mechanics, Maharashtra Institute of Technology, Pune, Maharashtra. He has published more than 20 papers in reputed journals.

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