

Evaluating steel fiber-reinforced self-consolidating concrete performance

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Abstract

The fiber-reinforced self-compacting concrete (FR-SCC) is considered a high-performance material, clustering characteristics of SCC combined with steel fibers. This paper assessed fresh and hardened state properties of a reference SCC and a FR-SCC with fibers of three types and three quantities of reinforcement, totalizing 10 mixtures. Fresh state properties of the mixture were evaluated through the tests of slump-flow, flow rate, filling ability, plastic viscosity by V-funnel, passing ability by J-ring and by L-box; and hardened properties comprised compressive strength, flexural strength, and flexural toughness. Overall, it was observed that increasing the amount and length of fibers hindered the mixture workability. Also, the flexural strength and flexural toughness increased as the length and the amount of fibers increased. Regarding mechanical properties, it was not possible to identify an equivalence between the types of fibers evaluated and the compressive strength of mixtures. The flexural was proportional to the amount of fibers, with increases of up to 30% for concretes with fibers.

Keywords

fiber-reinforced self-consolidating concrete, flexural toughness, steel fibers