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Performance Analysis of Self-Compacting Concrete Modified with Fiber for Enhanced Fracture Resistance

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Abstract: *The fibers employed in this research include chopped glass fibers, carbon fibers and basalt fibers, each with a length of 12 mm, incorporated at volume fractions of 0.0%, 0.1%, 0.15%, 0.2%, 0.25% and 0.3%. The study was conducted in two phases: first, developing an M30 grade SCC mix design and second incorporating the selected fibers to assess their impact on fresh and hardened properties. Results indicate significant improvements in overall performance with fiber addition. Carbon fiber-reinforced SCC demonstrated superior mechanical properties but reduced fresh workability due to higher water absorption whereas glass fiber-reinforced SCC exhibited the best performance in the fresh state. Basalt fiber-reinforced SCC achieved an optimal balance of performance and cost emerging as the most practical option for improving overall SCC quality.*

Keywords: Self-Compacting Concrete, Fiber Reinforcement, Basalt Fiber, Scanning Electron Microscopy