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Effect of Coir Fibre on Fly Ash Geopolymer Concrete Properties

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ABSTRACT

The use of fly ash in geopolymer concrete has gained significant attention as an environmentally friendly alternative to conventional cement concrete, owing to its reduced carbon footprint and improved long-term performance. Integrating coir fibre, a natural fibre obtained from coconut husks, into fly ash-based geopolymer concrete can significantly influence its mechanical and durability properties. Coir fibre acts as a reinforcing material, enhancing tensile strength, flexural strength, and crack resistance, while also improving the ductility and toughness of the concrete. The inclusion of coir fibres in varying percentages helps to mitigate the brittle nature of geopolymer concrete and reduces the propagation of micro-cracks under load. Experimental studies indicate that an optimum fibre content exists, beyond which workability decreases and strength gains may plateau. Additionally, coir fibres contribute to energy absorption during failure, enhancing post-cracking performance. The study of coir fibre reinforced geopolymer concrete also highlights the importance of proper fibre dispersion and curing techniques to achieve uniform strength development.