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A Study of Mechanical Performance of Coir Fibre Reinforced Fly Ash Based Geopolymer Concrete

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ABSTRACT

The increasing demand for sustainable construction materials has led to the exploration of alternative binders and natural fibres in concrete. Fly ash-based geopolymer concrete has emerged as a viable eco-friendly alternative to conventional Portland cement concrete due to its lower carbon footprint and excellent long-term strength. Incorporating coir fibre, a natural lignocellulosic material derived from coconut husk, can enhance the mechanical properties of geopolymer concrete by improving tensile strength, ductility, and crack resistance. This study focuses on evaluating the mechanical performance of coir fibre reinforced fly ash-based geopolymer concrete through experimental testing, including compressive strength, split tensile strength, and flexural strength. Different percentages of coir fibre are added to the mix to determine the optimal fibre content that maximizes performance without compromising workability. The study also investigates the influence of curing regimes on strength development and the interaction between fly ash content and fibre reinforcement. Preliminary results indicate that coir fibre improves the post-cracking behaviour and toughness of geopolymer concrete, while fly ash contributes to enhanced long-term strength and durability.