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Mechanical and microstructural properties of geopolymer composites reinforced with synthetic fibers

Geopolymers are inorganic polymers; they have high compressive strength, low drying shrinkage, good fire resistance and superior durability in the aggressive environment compared to Portland cement concrete. Geopolymers can be used as a binder of lightweight aggregate and as reinforcement material and composite materials, especially for organic compounds to improve its flame resistance. In this study, the effects of synthetic fibers on the mechanical properties of fibre-reinforced geopolymer will be investigated. Fiber reinforcement has emerged as a way to improve the brittleness of geopolymer. The goal of the present work is to examine the effect of addition of various amounts (from 1 vol% to 10 vol%) with different type of synthetic fibers (PP, PE, E-glass, etc.) in a high strength 40°C cured geopolymer matrix. The performance of the synthesized geopolymer composites are evaluated in terms of fresh and hardened state properties, such as, workability, thermal resistance, compressive strength, modulus of elasticity, flexural tensile strength, durability in aggressive environment (acidic or basic environment) as well as on the microstructure of geopolymer.

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