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INFLUENCE OF UNTREATED ABACA FIBRE ON MECHANICAL PROPERTIES OF LIGHTWEIGHT FOAMED CONCRETE

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Abstract

Presently, the expenditure on construction materials grows dramatically along with the enduring effect on the ecosystem, and it has led the academics to the recognition of natural plant fibres such as abaca fibre (AF) for enhancing the mechanical properties of concrete. AF is plentifully obtainable making it fairly relevant to be employed as a strengthening material in lightweight foamed concrete (LFC). Moreover, natural plant fibre-reinforced concrete has been progressively utilized in construction for several decades to decrease crack growth under the static load. This paper anticipates examining the effectiveness of the addition of AF in LFC to enhance its mechanical properties. LFC specimens of 550 kg/m^3 density were reinforced with AF at weight fractions of 0.00%, 0.15%, 0.30%, 0.45% and 0.60%. Three parameters have been assessed which were flexural strength, compressive strength and tensile strength. The results revealed that adding 0.45% AF into LFC enables optimal compressive, flexural and splitting tensile strengths. The presence of AF augments material strength by filling spaces, micro-cracks, and gaps inside the LFC structure. Additionally, AF helped reduce crack spreading when the plastic state of the LFC cementitious matrix was loaded. Though, further, than the optimum level of AF addition, accumulation and the non-uniform distribution of AF were identified, which triggers the lowering of the LFC strength properties substantially. The output of this preliminary investigation would give a better understanding of the potential utilization of plant fibre in LFC. It is of great importance to drive the sustainable development and application of LFC material and infrastructures.

Keywords: Foamed concrete; Mechanical properties; Compressive strength; Flexural; Tensile.