



7th International Conference on Civil Engineering, Architecture and Urban Planning Elites

Copenhagen, Denmark

19 - 21 July 2024

Physical and Mechanical Properties of Fiber-Reinforced Lightweight Concrete

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Abstract

Lightweight concrete suffers low strength and high volumetric changes due to the differences between density and elastic modulus between lightweight aggregate and cement paste. This paper presents a study on the physical and mechanical properties of lightweight concrete with density below 800 kg/m^3 incorporating polypropylene fibers. Nine lightweight concrete mixes were prepared and tested in order to evaluate the influence of different fibers types and content on the performance of the developed material. Mechanical properties include compressive and flexural strength were measured, where physical properties include density, thermal conductivity and drying shrinkage were determined. The experimental results revealed that lightweight concrete with compressive strength of 14 MPa and flexural strength of about 3 MPa has been developed for some mixes which can be used for structural applications. On the other hand, thermal insulation depends mainly on the density of concrete. The use of polypropylene fiber has significant influence in reducing drying shrinkage and improving flexural strength.

Keywords: Lightweight concrete, Thermal conductivity, Drying Density