

Investigating the Mechanical Properties of Geopolymer Concrete Containing Microencapsulated Phase Change Materials

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Abstract : Micro encapsulated phase change materials (MPCM) may be utilized to increase the energy efficiency of buildings by the addition of MPCM to concrete structures. However, addition of MPCM to Portland cement concrete is known to reduce the compressive strength of the concrete. Accordingly, it is interesting to also examine the effect of adding MPCM to geopolymer concrete. Geopolymer binder is synthesized by mixing aluminosilicate materials in amorphous form with a strong alkali activator, and have a much lower CO₂ footprint than Portland cement concrete. In this study, the mechanical properties of fly ash-based geopolymer concrete with different types and contents of MPCM were investigated at different curing temperatures. The aim was to find the optimum amount of MPCM which still maintain the workability and compressive strength at an acceptable level. The results revealed that both workability and compressive strength of geopolymer concrete decrease after adding MPCM. Also, the percentage of strength reduction can be variable by different types of MPCM.

Keywords : compressive strength, concrete, curing, geopolymer, micro-encapsulated PCM

Conference Title : ICSBMCT 2017 : International Conference on Sustainable Building Materials and Construction Technologies

Conference Location : Vancouver, Canada

Conference Dates : August 07-08, 2017