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Event

The 1st International Online Conference on Functional Biomaterials

Session

Bio-fabricated and 3D Printed Biomaterials

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sciforum-089528

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Production and test of concrete with ice mold

Authors

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Abstract

This investigation is based on the novel technique of Ice Formwork where ice is used as molding material for cementitious materials. Its assets are manifold; a stark decrease in manual labor at many stages of the process including creation of the ice mold and demolding, no non-recyclable waste production. This research examines the effects of antifreeze, namely Calcium Chloride and Sodium Chloride, on the mechanical properties of mortar samples. In total, three experiments are conducted. Firstly, mortar samples with a solution of 0-3wt% of $CaCl_2$ as antifreeze are cured at temperatures of -20°C, -2°C, and 23°C. Secondly, two Calcium Chloride and Sodium Chloride solutions are investigated with percentages of 9% and 6% and 15% and 5% respectively. These are used in mortar and cured at temperatures of -11°C and 23°C. Each of the aforementioned samples in the two first experiments are tested at three different ages; after 3, 7, and 14 days. The third experiment consists of exploring the hydration curve of mortar samples cured at subfreezing temperatures. This entails two different samples being cured at two different temperatures during 24 hours: a 3% $CaCl_2$ sample at -2°C and a 15% $CaCl_2$ and 5% NaCl samples at -11°C. The mechanical properties investigated are the bending and compression stresses at failure point. The tests are comprised of a 3-point bending and compression tests, in which the data being processed are the failure points.

Keywords

ice moulding, concrete, structural behavior

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