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Effectiveness of the Use of Polycarboxylic Ether Superplasticizers in High Performance Concrete Containing Silica Fume

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Abstract : The incorporation of polycarboxylate ether superplasticizer (PCE) and silica fume (SF) in high-performance concretes (HPC) leads to the achievement of remarkable rheological and mechanical improvements. In the fresh state, PCEs are adsorbed on cement particles and dispersants, in turn promoting the workability of the concrete. Silica fume enables a very well compacted concrete to be obtained, which is characterized by high mechanical parameters in its hardened state. Some PCEs are incompatible with silica fume, which can result in the loss of slump and in poor rheological behavior. The main objective of the research is the study of the influence of three types of PCEs, which all have a different molecular architecture, on the rheological and mechanical behavior of high-performance concretes containing 10% of SF as a partial replacement of cement. The results show that the carboxylic density of PCE has an influence on its compatibility with SF.

Keywords : polycarboxylate-ether superplasticizer, rheology, compressive strength, high-performance concrete, silica fume
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