

Combined Effect of Heat Stimulation and Delayed Addition of Superplasticizer with Slag on Fresh and Hardened Property of Mortar

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Abstract : To obtain the high quality and essential workability of mortar, different types of superplasticizers are used. The superplasticizers are the chemical admixture used in the mix to improve the fluidity of mortar. Many factors influenced the superplasticizer to disperse the cement particle in the mortar. Nature and amount of replaced cement by slag, mixing procedure, delayed addition time, and heat stimulation technique of superplasticizer cause the varied effect on the fluidity of the cementitious material. In this experiment, the superplasticizers were heated for 1 hour under 60 °C in a thermostatic chamber. Furthermore, the effect of delayed addition time of heat stimulated superplasticizers (SP) was also analyzed. This method was applied to two types of polycarboxylic acid based ether SP (precast type superplasticizer (SP2) and ready-mix type superplasticizer (SP1)) in combination with a partial replacement of normal Portland cement with blast furnace slag (BFS) with 30% w/c ratio. On the other hands, the fluidity, air content, fresh density, and compressive strength for 7 and 28 days were studied. The results indicate that the addition time and heat stimulation technique improved the flow and air content, decreased the density, and slightly decreased the compressive strength of mortar. Moreover, the slag improved the flow of mortar by increasing the amount of slag, and the effect of external temperature of SP on the flow of mortar was decreased. In comparison, the flow of mortar was improved on 5-minute delay for both kinds of SP, but SP1 has improved the flow in all conditions. Most importantly, the transition points in both types of SP appear to be the same, at about 5±1 min. In addition, the optimum addition time of SP to mortar should be in this period.

Keywords : combined effect, delay addition, heat stimulation, flow of mortar

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