

Experimental and statistical evaluation of rheological properties of self compacting concrete containing fly ash and ground granulated blast furnace slag

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Abstract

This study examines an attempt to produce self-compacting concrete (SCC) containing fly ash (FA), ground granulated blast furnace slag (S) and both (FA+S). The effects of these materials on the rheological properties of the SCC mixes were studied experimentally. The study began with three groups of SCCs, each with 25% water binder (w/b) and 550 kg/m³ total binder content. Instead of superplasticizers (SP), the chemical admixtures were lignosulphonates (LS), which replaced Portland cement (PC) at levels by weight of 10%, 20%, 30%, 40%, 50%, and 60%. The fresh properties of the mixtures were examined experimentally for slump flow diameter, T50 time, V-funnel time, and L-box height ratio. In the mixtures with FA alone, a continuous decrease was observed in compressive strength. Increases in strength ended at 40% in the case of FA alone, and 30% for both the S and FA+S mixes. Statistical analysis was carried out to assess the effect of experimentally substituted materials FA and S, with results showing that S had a greater influence than FA on T50 time, V-funnel, L-box height ratio, and compressive strength, while FA had more effect than S on the slump flow diameter test.