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The Effect of Supplementary Cementitious Materials on Fresh and Hardened Properties of Self-Compacting Concretes

Authors : Akram Salah Eddine Belaidi, Said Kenai, El-Hadj Kadri, Benchaâ Benabed, Hamza Soualhi

Abstract : Self-compacting concrete (SCC) was developed in the middle of the 1980's in Japan. SCC flows alone under its dead weight and consolidates itself without any entry of additional compaction energy and without segregation. As an integral part of a SCC, self-compacting mortars (SCM) may serve as a basis for the mix design of concrete since the measurement of the rheological properties of SCCs. This paper discusses the effect of using natural pozzolana (PZ) and marble powder (MP) in two alternative systems ratios PZ/MP = 1 and 1/3 of the performance of the SCC. A total of 11 SCC's were prepared having a constant water-binder (w/b) ratio of 0.40 and total cementitious materials content of 475 kg/m3. Then, the fresh properties of the mortars were tested for mini-slump flow diameter and mini-V-funnel flow time for SCMs and Slumps flow test, L-Box height ratio, V-Funnel flow time and sieve stability for SCC. Moreover, the development in the compressive strength was determined at 3, 7, 28, 56, and 90 days. Test results have shown that using of ternary blends improved the fresh properties of the mixtures. The compressive strength of SCC at 90 days with 30% of PZ and MP was similar to those of ordinary concrete use in situ.

Keywords : self-compacting mortar, self-compacting concrete, natural pozzolana, marble powder, rheology, compressive strength
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