The Effect of Using Multi Types of Mineral Admixtures on Some Properties of Lightweight Self-Compacting Concrete

Abstract The main objective of this research was studying the effects of using multi types of mineral admixtures as high reactivity Attapulgite (HRA), high reactivity Metakaolin (HRM) and fly ash (FA) on some rheological and mechanical properties of lightweight self-Compacting concrete (LWSCC), when were used as a partially replacement by weight of cement. The results showed that using of (HRA) and (HRM) increased the superplasticizer (SP) dosage, while (FA) with spherical particles reduced the (SP) dosage relative to reference mix (Ref. mix) to get the same slump flow target value. The optimum content for (HRA) used in this study was 10 %, and the percentages of increment in compressive strength and splitting tensile strength relative to (Ref. mix) were (10.0%, 12.2%, 11.15% and 12.3%) and (8.8%, 17.46%, 16.34% and 14.66%) for 7, 28, 56 and 90 days respectively. Using of (FA) reduced early age strength, but long term strength increased with (FA) content increases. LWSCC mix contained 10% (HRM) showed a better mechanical properties than both (HRA) and (FA) LWSCC mixes, and the percentages of increment when cement was replaced with 10 % (HRM) relative to (Ref.mix) were (15.0%, 17.6%, 13.9% and 15.7%) and (16.0%, 24.2%, 22.2% and 21.6%) at 7, 28, 56, and 90 days for compressive strength and splitting tensile strength respectively.

Keywords: Lightweight self-compacting concrete, High reactivity Attapulgite, High activity Metakaolin, Fly ash.

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