

Fluid transport in high volume fly ash mixtures with and without internal curing

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Abstract

The transport of fluid and ions in concrete mixtures is central to many aspects of concrete deterioration. As a result, transport properties are frequently measured as an indication of the durability that a concrete mixture may be expected to have. This paper is the second in a series investigating the performance of high volume fly ash (HVFA) mixtures with low water-to-cementitious ratios (w/cm) that are internally cured. While the first paper focused on strength and shrinkage, this paper presents the evaluation of the transport properties of these mixtures. Specifically, the paper presents results from: rapid chloride migration (RCM), rapid chloride penetration test (RCPT), apparent chloride diffusion coefficient, surface electrical resistivity, and water absorption. The test matrix consisted of mortar samples with two levels of class C fly ash replacement (40% and 60% by volume) with and without internal curing provided with pre-wetted lightweight fine aggregates (LWA). These mixtures are compared to plain ordinary portland cement (OPC) mortars. The results indicate that HVFA mixtures with and without internal curing provide benefits in terms of reduced transport coefficients compared to the OPC mixtures.

Keywords

Transport properties; High volume fly ash; Internal curing; Chloride; Water absorption