



Experimental Study of Applying Natural Zeolite as A Partial Alternative for Cement in Self-Compacting Concrete (SCC)

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(Date of received: 25/01/2019, Date of accepted: 15/04/2019)

ABSTRACT

In recent years, with the increasing demand for modern and environmentally friendly materials, natural pozzolans can be proved to be such a material and several researchers have focused their research efforts in using it as a partial substitute in the manufacture of concrete and mortar. This study concerns the fresh and hardened properties of self-compacted concrete (SCC) with natural zeolite (NZ). SCC mixtures were prepared by inclusion various amounts of NZ (0–20% by weight of cement) at different water/binder ratios. The fresh properties were investigated by slump flow, visual stability index, T50, V-funnel and L-box. The slump flow and compressive strength changes with hauling time were also considered. The hardened properties were tested for compressive strength, splitting tensile strength, ultrasonic pulse velocity (UPV), initial and final absorption. Results showed that with the inclusion of NZ, SCC can be successfully produced with satisfactory performance in flow ability, passing ability and viscosity. For all mixtures, flowability was lost with hauling time, although the rate of slump flow reduction was higher for mixes with higher amount of NZ. Regarding to hardened properties, the effect of NZ on the compressive and splitting tensile strength of SCC mixtures is generally related to its W/B ratio. Moreover, compressive strength enhancement was seen for mixes with slump flow higher than 550 mm at prolonged mixing time. The UPV measurement shows that the effect of NZ on the UPV values at a high compressive strength are negligible. Compared to control SCC, absorption characteristics of SCC containing NZ significantly decrease with increasing ages.

Keywords:

Self-compacting concrete, Zeolite, Durability, Hardened properties.