

Effect of Addition Rate of Expansive Additive on Autogenous Shrinkage and Delayed Expansion of Ultra-High Strength Mortar

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Abstract : In this study, the effect of expansive additives on autogenous shrinkage and delayed expansion of ultra-high strength mortar was explored. The specimens made for the study were composed of ultra-high strength mortar, which was mixed with ettringite-lime composite type expansive additive. Two series of experiments were conducted with the specimens. The experimental results confirmed that the autogenous shrinkage of specimens was effectively decreased by increasing the proportion of the expansive additive. On the other hand, for the specimens, which had 7% expansive additive, and were cured for seven days at a constant temperature of 20°C, and then cured for a long time in either in an underwater, moist (Relative humidity: 100%) or dry air (Relative humidity: 60%) environment, excessively large expansion strain occurred. Specifically, typical turtle shell-like swelling expansion cracks were confirmed in the specimens that underwent long-term curing in an underwater and moist environment. According to the result of hydration analysis, the formation of expansive substances, calcium hydroxide and alumina, ferric oxide, tri-sulfate contribute to the occurrence of delayed expansion.

Keywords : ultra-high strength mortar, expansive additive, autogenous shrinkage, delayed expansion

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