Generalization of strength versus water-cementitious ratio relationship to age

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Abstract

In this paper, an attempt is made to generalize Abrams' law to any given age. It is intended to enhance the applicability of this law for practical applications by covering 3 to 365 days range. The result makes the prediction of concrete strength more convenient. Two novel methodologies, parameter-trend-regression and four-parameters-optimization methodology, have been proposed to extend the Abrams' formula and a power formula to any given age without collecting data at that age. Experimental data from several different sources are used to validate the reliability of these methodologies. As a result of the analysis presented in this study, a set of generalized water-cementitious ratio formulas is proposed for concrete with limited replacement percentage of fly ash. It is shown that the generalized formulas agree with the experimental data better than the original formulas do.

Keyword：concrete, compressive strength, modeling.