Coefficient Of Moisture Contraction - A New Concrete Material Parameter

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Summary

In this research, normal concrete with three water-cement ratios (0.45, 0.5 and 0.6), self compacting concrete, enhanced self compacting concrete and silica fume concrete are considered for shrinkage study. An experimentally derived relationship between shrinkage and moisture loss is obtained for the various concretes and the following invariant form is suggested: epsilon(sh) = alpha(hygro), * Delta M where epsilon(sh) = free shrinkage strain; alpha(hygro) = coefficient of moisture contraction; and Delta M = moisture loss percentage. Here a new concept of ahygro, referred to as coefficient of moisture contraction, is introduced. It is similar to that of coefficient of thermal expansion alpha(therm). The introduction of ahygro makes stress computations due to moisture movement rather convenient, much in the same manner as thermal stress computations. Loss of moisture Delta M can be obtained from the associated boundary value problem governed by Fick's law (analogous to change of temperature Delta T from the associated heat transfer problem), followed by computations of free shrinkage strain using the suggested form and the associated stress buildup can then be found by using a standard finite element package.

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