MODEL OF THE STRENGTH PROCESSES OF MECHANICALLY ACTIVATED CONCRETE MIXTURES *

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The approach of determining the macrokinetics parameters for the concrete setting through the kinetic characteristics of curing at different temperatures is discussed. Mechanical activation provides an increase in the strength of concrete in the initial time of hardening, reducing the setting time and a more complete use of cement binding properties [1–3]. The activation nature of the concrete hydration processes has been experimentally confirmed and the macrokinetics parameters required for computer simulation of concrete setting taking into account the mechanical activation of initial components has been determined. Computer simulation of concrete early stages hardening processes allows to obtain a prediction of the structure and properties of concrete.

In model the thermomechanical state and phase composition of the hardening concrete are considered simultaneously at macro and microscopic levels. The formation of the structure of composite materials is based on cement is associated with the formation of synthetic calcium hydrosilicates. The structure of the initial compact reflects the heterogeneity of the initial powder mixture and pores in separate layers and interlayer interfaces, the polyfractionality of the components and their conglomerates. At each modeling step in each microlayer, the effective characteristics of the material are used. These characteristics are determined by the macroscopic structure of the initial representative volume of concrete mixture, by the distribution of the initial components and pores in it, by the heterogeneity of the concentrations of the phase and fractional composition of the components [4].

An approach is proposed for estimating the macrokinetic parameters of the cement hydration process based on the results of mechanical tests of determining the kinetics of the curing of concrete samples at different temperatures. The results allow us to use a model of coupled processes in reacting media [4] for computer simulation of the setting of a concrete mixture.

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