

Numerical models of non-stationary concrete behavior

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Mechanical and mathematical models of concrete deformation and destruction was reviewed. A list of concrete models suitable for numerical modeling of non-stationary concrete behavior at the modern level of computer development was determined [1], taking into account the presence of constants of models and their adequacy in describing the behavior of concretes under low-speed impact.

A new variant of the defining equations is proposed. These equations are a development of widely used concrete models: the deformation theory of plasticity by G.A. Gineev and the Holmquist-Johnson-Cook model.

The most used and experimentally justified sets of constants for these models are presented. Several correlation relationships allowing to estimate constants of models for developed high-strength concretes in case of absence of corresponding experimental data are given.

Numerical algorithms for realizing the determining equations of concrete models have been developed, tested and described in detail. Numerical models were validated by comparison with experimental data on penetration depth and ballistic curves for the axisymmetric case. Satisfactory agreement was obtained on the results of the calculations with the experimental data.

[1] Ostrik A and Kim V 2020 *Constructions from composite materials* 11–24