Kinetic model of combustion of coarse-grained gunpowder and its parametric identification

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There are various theoretical approaches to describe the processes that occur during the gunpowder combustion [1]. In recent years, so-called phenomenological models have become widespread. One of these is the model of combustion of coarse-grained gunpowder, the development and description of the positions, as well as the parametrization of which were provided in the present work. Its distinctive feature is taking into account the possibility of both progressive and degressive combustion, which is due to the random distribution of hidden surfaces in the gunpowder.
To determine the parameters of the model, experimental dependences of the pressure of gases on time in a closed explosive bomb for coarse-graines gunpowder of the grade KZDP-2 a loading density of 0.02 to 0.1 g/cm^3, obtained at RFNC-VNIIEF, as well as data from [2] for other types of gunpowder, are used.
Numerical modeling of the combustion of powder charges was carried out in a two-dimensional Euler solver, the result of which correctly describe experimental dependencies, which confirms the applicability of the proposed model.

[1] Serebryakov M E and Greten K K 1949 *Internal ballistics* (M: Oborongiz)
[2] Shilling N A 1940 *Gunpowder course* (M: Oborongiz)