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## **Investigation of the influence of non-uniform porosity of a charge consisting of granulated powder elements on intra-ballistic parameters**

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### **Abstract**

In this paper, the modeling of the formation of a powder charge consisting of granulated powder elements is considered. The aim of the work is to create a model that allows one to take into account the uneven distribution of powder elements along the length of the charge when calculating the intraballistic characteristics based on the gas-dynamic approach, as well as to study the effect of the porosity of the powder charge on its intraballistic characteristics, assuming that porosity is the volume of voids per unit volume occupied by the powder elements. A technique for modeling the formation of a charge consisting of granulated powder elements and its visualization are presented. The initial and final conditions for the formation of a charge consisting of granulated powder elements are determined. The paper presents both analytical and experimental dependences of the pressure of the powder gases when fired. Systems of equations that are used in the gas-dynamic approach to the shot process are given. The study of the influence of uneven porosity on the nature of pressure development in the gun barrel was carried out. The curves of the graphs of the dependence of the pressure in the area of the chamber bottom and the ammunition bottom for various conditions of the distribution of porosity over the considered section of the chamber are identified. In order to determine how the distribution of porosity

along the length of the entire charge affects the pressure of the propellant gases during firing, calculations of the intraballistic parameters were carried out for all formed charges on the basis of the gas-dynamic approach. The gas-dynamic approach is based on considering the movement of the gas-powder mixture along the projectile space. In this case, all intraballistic processes are described using a system of differential equations. Based on the results of the study, conclusions about the effect of porosity on the nature of the change in pressure curves were drawn.

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