EXPERIMENTAL VALIDATION OF GAS-GUN BALLISTIC CALCULATION

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The up-to-date capabilities for numerical simulation of gas-dynamic problems require higher accuracy of the experimental data. This is achieved using, among others, bore-type loading devices. At RFNC – VNIITF a complex of loading facilities has been put into operation and used which allows varying loading conditions in a wide range to load samples of the materials under study.

Designing of the experiments requires preliminary investigations to plot ballistic tables. Special software is also useful to prepare the shots since it considers the multifactor nature of the flyer boost-up within the ballistic facilities and is validated against the shot results (according to the ballistic table).

The purpose of the work is to experimentally validate the ballistic calculation of the light-gas gun with a 44-mm bore.

The objectives of the work involve:

- obtaining experimental data on the dependence of the flyer velocity on the initial pressure of the working gas and the flyer mass; and
- calculating the internal ballistics and flyer velocities using the validated gas-gun model.

In the work, the experimental and calculated ballistic tables were obtained showing the dependence of the flyer velocity on the normalized initial pressure of the working gas. Air and helium were used as the working gases. The QGunShot code validated against the experiments was used to calculate velocities for the given initial pressures at different flyer masses. The calculation is shown to be in a good agreement with the experiment. The QGunShot code allows predicting the shot modes when designing gas-dynamic experiments on the light-gas gun with a 44-mm bore.