Title: ***INVERSE METHODS IN INTERIOR BALLISTICS PROCESSES STUDY***

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The use of inverse methods became possible due to progress in theory of ill-posted mathematical problems resent 30 years. On the other hand the growth of computer technologies allows solving numerically more and more complicated problems. However there methods are not widely used in combustion diagnostics and in interior ballistics processes study.

Severe experimental conditions limit a possibility of direct measurements at the solid propellant grain burning. Methods of experimental data processing considered time averaging do not let to receive sufficient accuracy. Therefore, inverse problems should be formed and solved for combustion parameters restoring by indirect methods. This work objective is the application of the modern and complicated inverse methods to problems of solid propellant erosive combustion study and other problems of interior ballistics.

In the frames of this work a large number of various experiments in small-scale rocket motors where carried out and a great deal of experimental data have been obtained. The obtained data where processed and some results where gained.

The investigated inverse problems: identification of erosive burning factor in supersonic and swirled flows, in combustion at the presence of the mass forces field; identification of unsteady burning rate or burning surface in semi-closed volume; identification of bimodal (polymodal) particle distributions at laser diagnostics of condensed combustion products dispersivity.

This results allow to make recommendations on further experiments organization and on adequate inverse problem formulation. Both experimental setups and methods and the investigated inverse problems has been formed the programming and methodical complex for the interior ballistics study.