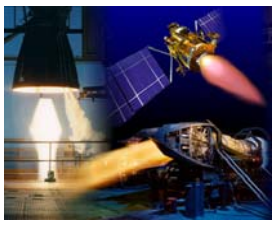
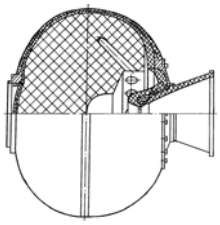
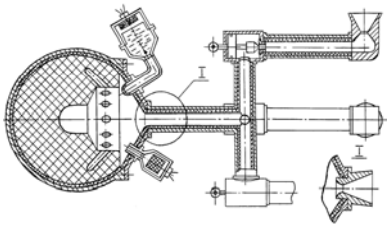
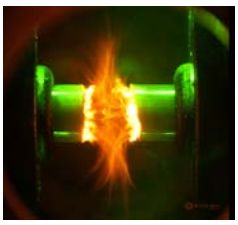
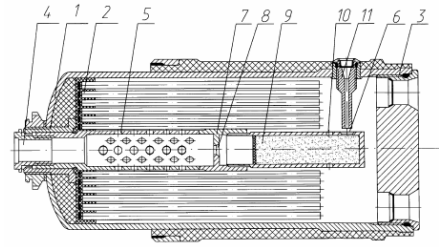
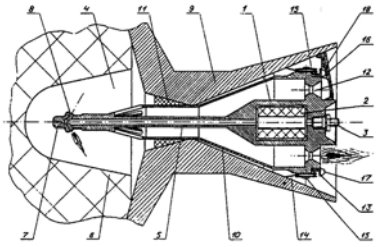
Encyclopedia on Combustion Instability and Anomalies in Solid Propulsion Physics

Writing Project

(Solid and Electronic Versions)



Motivations and Objectives

The evolutionary history of solid propulsion physics reflects to some extent the history of the investigation of unstable combustion and methods for its prevention and restriction.

The problem of combustion instability and anomalies of burning of the energetic materials traditionally remains one of actual problems in the modern theory of combustion.

The aim of preparation of the Encyclopedia is to provide objective analysis of the state-of-the-art of research in the field of combustion instability and anomalies connected with solid propulsion physics as well as to determine the most perspective directions of researches in this field and to plan further prospects of researches in the solid propulsion physics.

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Tentative List of Topics

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	Combustion Instability and Anomalies in the Ignition Systems
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	Kalakoutsky's Effect of the Pressure Waves Abnormal Strengthening in the Gun Tube Systems
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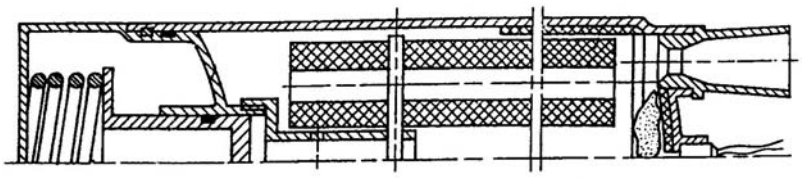
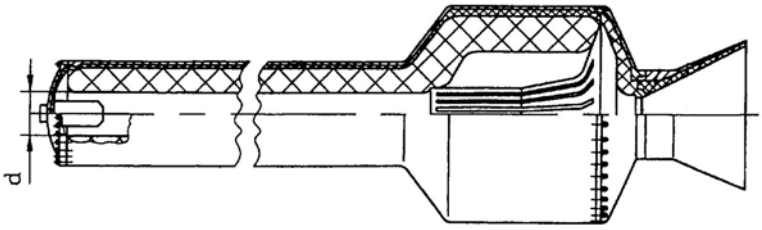
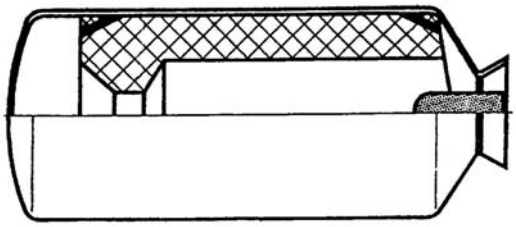
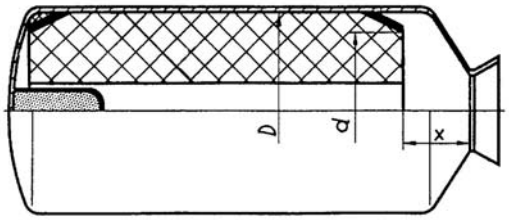
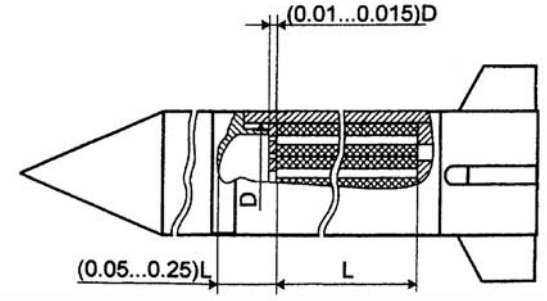
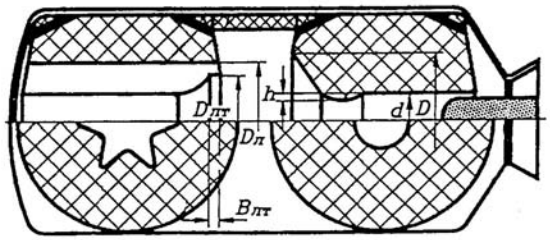
New Technologies for Suppression of Combustion Instability in the SPS

Design Schemes and Brief Description
The SPRM with acoustic damper, manufactured as the cylindrical two-level chamber. Device provides effective suppression of vibrating burning in the wide frequencies band. 
 The SPRM with large-lengthened casing. The engine design provides effective suppression of longitudinal pressure pulsations (longitudinal acoustic oscillations) with low frequencies.
The SPRM contains main and additional chambers, connected by subsonic nozzle. The engine design provides effective suppression and stabilization of the low and high-frequency combustion products oscillations at the ignition system operation and at appearance of the charge unstable burning. 
 The SPRM contains the acoustic cavity of given sizes, and at the solid propellant charge end faces are installed the elastic boots. The engine design provides effective suppression of the high- and low-frequency pressure oscillations at appearance of the charge unstable burning.

Design Schemes and Brief Description
In the SPRM, between the front bottom and the engine casing the perforated thin diaphragm is installed, and between the diaphragm and the front bottom are located the acoustic cavity. Oscillations of the front diaphragm provide additional suppression of the combustion products acoustic oscillations. 
 The SPRM contains a sectional solid propellant charge and the acoustic cavities, located between the charge sections. The engine design provides stability of the internal ballistics characteristics by suppression of the pressure oscillations in the wide frequencies band, at appearance of the charge unstable burning.