PULSED RADIATION-MAGNETOGASDYNAMIC SCHEMES FOR HIGH-POWER ELECTROPHYSICAL AND POWER PLANTS

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The paper presents a generalized mathematical model of pulsed radiation-magnetogasdynamic (RMGD) systems, which allows, in particular, to solve the problem of generation, stability and control of high-temperature formation in a magnetized matter compression scheme for a neutron source and will be useful for a reactor [1–5]. Based on the developed models, the processes of converting initially stored electromagnetic energy into other types of energy in electric discharge sources, including a magnetoplasma compressor, are investigated. The problems under consideration cover a wide range of tasks in various fields of science and technology, including high energy density physics, astrophysics, thermophysics, electrophysics, and plasma physics.

Multidimensional computational models of processes in pulsed and stationary gas flows have been created, and the results of mathematical modeling and numerical analysis describing and predicting the behavior of plasma in a magnetic configuration have been summarized. A unique mathematical model has been developed for studying the unsteady processes of heating and compressing matter in an external magnetic field by several laser and plasma beams. The plasma dynamic parameters of a cylindrical target are estimated for a combined scheme of exposure to intense energy flows. The results of fundamental research can be used to substantiate the prospects of magnetic inertial systems with high-temperature heating of matter by lasers and high-speed plasma jets in an external magnetic field, as well as in the evaluation of power plants, particle sources, neutrons and promising engines based on electric discharge schemes.

This review will describe a set of programs that include internal energy release, gas dynamics, and radiation transport, as well as suitable for studying the properties of pulsed dense plasma during target compression, taking into account convection, radiation, and physico-chemical transformations in the presence of an external magnetic field.

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