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RADIATION MAGNETIC GAS DYNAMICS SIMULATION OF PLASMA JETS *)

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Modern pulsed power facilities are actively used for laboratory modeling of astrophysical processes [1]. One of the most relevant areas of laboratory astrophysics is the study of astrophysical jets, that is, emissions of collimated plasma streams from the centers of astronomical objects, which were discovered in the 50s of the last century and are currently being detected in several hundred young stars, quasars and black holes [2].

In experiments [3, 4] at the IMRI-5 installation (ISE SB RAS) at a current amplitude of 300 kA and a front rise time of 600 ns, pulsed plasma in the form of collimated jets was formed using a high-current vacuum arc discharge into which a collimator was installed. Along with jets of metallic plasma [3], jets of hydrogen plasma were obtained [4]. Of great interest is the study of the interaction of such a jet with various objects in the laboratory, since hydrogen is the main part of cosmic matter.

Computational experiments using radiation magnetic gas dynamics (RMGD) models are an integral part of such studies. The simulation of plasma jets was carried out using the MARPLE-3D RMGD software [5], adapted for the range of tasks under consideration. The use of wide-range equations of state and improved models of energy transfer by radiation made it possible to obtain calculated results comparable with experimental data and to evaluate the similarity criteria of astrophysical and laboratory jets.

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