STUDY OF MHD INSTABILITIES DURING Z-PINCH IMPLOSION

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We present a series of 3D simulations of multiwire arrays implosion carried out by means of RMHD code MARPLE-3D (Keldysh Institute of Applied Mathematics) with the aim to explore plasma instabilities arising at the end of plasma ablation and developing up to the final stage of the wire array implosion. Different configurations of wire arrays were investigated. Cylindrical and quasispherical wire arrays were studied, as well as single and nested array designs were considered.
Plasma emission was reproduced via prolonged plasma ablation model including spatial nonuniformity of plasma production rate consistent with experimental X-ray images of lower plasma emission areas. The distinctions of wires evaporation in nested arrays were implemented.
It was demonstrated that dedicated design of the electrodes, the wire array, and mass distribution along the wires results in very compact spherical bright radiation source in the centre of the array. The formation of magnetic flux breakthroughs during wire array implosion was reproduced.
The numerical results were compared with the experimental data obtained at Angara-5-1 facility (TRINITI, Troitsk).

Computations were carried out using supercomputers K-100 (KIAM RAS), MVS-100K/ MVS-10P (JSCC RAS) and "LOMONOSOV" (MSU).

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