

NUMERICAL SIMULATION OF AN EXPERIMENT WITH PLANAR ARRAY OF ALUMINUM WIRES USING FLUX-3D CODE

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The results of numerical simulation of an indicative experiment in an experimental series [1] with aluminum planar arrays on a pulsed power generator supplying current pulse with an amplitude of 2 MA and a rise time of 1 mks are given. Calculations of the experiment with a planar array with a width of 135 mm, consisting of 28 Al wires with a diameter of 26.8 microns and a length of 25 mm, were carried out using the three-dimensional magneto-hydrodynamic code FLUX-3D [2] in a multi-group (spectral) diffusion approximation of radiation transfer in plasma and taking into account the phenomenon of prolonged plasma ablation from the array wires. The results of numerical modeling reproduce the main characteristics of the aluminum plasma compression recorded in the experiment - implosion time, energy and time parameters of the generated X-ray pulse both in the full spectrum and in the quantum energy range above 1 keV. The efficiency of generating Ka-line of aluminum when powering planar array with a microsecond current pulse has been confirmed.

[1] M.Sh. Ibragimov, A.P. Orlov, B.G. Repin, etc. ”Experimental study of aluminum K-line generation using planar multi-wire arrays”, Report on this conference

[2] A.P. Orlov and B.G. Repin. ”Numerical simulation of multi-wire Z-pinch within the framework of 3-D magneto-hydrodynamics”, IEEE Trans.on Plasma Science, 2015, V.43, No.8, P.2515