Features of the interaction of plasma flows and the axial magnetic field during implosion of nested conical arrays [[1]](#footnote-1)\*)

DOI: 10.34854/ICPAF.2020.47.1.087

1Aleksandrov V.V., 1Branitsky A.V., 2Boldarev A.S. , 2Vichev I.Yu., 2Gasilov V.A., 1Grabovsky E.V., 1Gritsuk A.N., 1Mitrofanov K.N., 2Olkhovskaya O.G., 2Sasorov P.V., 1Shishlov A.O.

1Troitsk Institute for Innovation and Fusion Research, Troitsk, Moscow, Russia;
 alexvv@triniti.ru
2Keldysh Institute of Applied Mathematics, Russian Academy of Sciences, Moscow, Russia

The results of experimental and numerical studies of current implosion in vacuum at the Angara‑5‑1 installation of a nested conical array with a discharge current pulse of up to 4 MA with a rise time of the leading edge of 100 ns are presented (Fig. 1).

|  |  |
| --- | --- |
|  |  |
|  |
|  |  |  |
| Fig. 1. Cone array: external cascade - conical array of 4 kapron 25 μm fibers, linear mass 22 μg / cm, *Rout*=10/5 [mm]; internal cascade – array of 40 W 6 μm wires, linear mass 220 μg / cm, *Rin*=3 mm. *H*=16 mm. a) - scheme of the experiment; b) - time dependence MRI power pulse in the spectral range (*hν*> 100 eV); c) frame images (positive) of the plasma of the nested array obtained by shadow laser probing at various points in time. The frame times *t*\*1 - *t*\*3 are indicated by circles (• LAS). The anode is above, the cathode is below; d) - the calculated density distribution at time t = 70 ns, shock waves between cascades; e) - time dependence of the rate of plasma formation (*1* - internal cascade, *3* - external cascade) and vaporized mass (*2* - internal cascade, *4* - external cascade); f) - distribution along the array radius: *1* - magnetic induction *B*φ, *2* - magnetic Mach number MA at time *t* = 70 ns (corresponds to a stable position of the shock wave), in the middle of the array height *z* = 8 mm. |

The work was financially supported by the Russian Foundation for Basic Research (project N. 18‑29‑21005, N.20-02-00007-a).

1. \*) [abstracts of this report in Russian](http://www.fpl.gpi.ru/Zvenigorod/XLVII/It/ru/CT-Alexandrov.docx) [↑](#footnote-ref-1)