# DISTRIBUTION OF PLASMA PARAMETER UPON ELECTRICAL WIRE EXPLOSION

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The current-driven explosion of fine wires is often used to study properties of dense plasma (for example, conductivity in Ref. 1). At best, the time dependences of current, voltage and volume of a sample are known in such experiments. Assuming that all energy discharged into the circuit is deposited in the plasma generated by the exploded wire, one can calculate the increase of its total internal energy and, consequently, specific parameters (for example, conductivity, density and etc.). In these experiments, it is very important to maintain a homogeneous distribution of plasma parameters in the discharge channel, but control of the plasma parameters' distribution has never been achieved in experiments.

Our experimental data show that expansion dynamics and homogeneity of wire-explosion products depend not only on the amount of energy deposited into the wire before the secondary breakdown but also on where the current flows after secondary breakdown. If the secondary breakdown develops inside the wire-explosion products and the energy is continuously and homogeneously deposited into the wire-explosion products, one can study the properties of plasma generated by exploded wire. However, the current also may flow in the plasma channel generated in surrounding media (see, for example Ref. 2). Therefore, it would be impossible to study the wire-explosion plasma properties using direct experimental data as in Ref. 1. The same can be said for the case of inhomogeneous deposition of energy even when current flows inside wire-explosion products. It was also performed comparison of numerical data obtained in IMM RAS with experimental results.

1. A.W. DeSilva and J.D. Katsouros. "Electrical conductivity of dense copper and aluminum plasmas." Phys. Rev. E **57**, 5945 (1998).
2. S. I. Tkachenko, D. V. Barishpoltsev, G. V. Ivanenkov, V. M. Romanova, A. E. Ter-Oganesyan, A. R. Mingaleev, T. A. Shelkovenko, S. A. Pikuz. "Analysis of the discharge channel structure upon nanosecond electrical explosion of wires." Phys. Plasmas **14,** 123502 (2007).