CONTROL OF INSTABILITIES FORMED DURING THE EXPLOSION OF FLAT FOILS [[1]](#footnote-1)\*)

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The results of the study of the electric explosion of aluminum foils with a thickness of 16 microns with an artificial periodic relief created by laser engraving are presented. The experiments were carried out on pulse high-current generators BIN (270 kA, 300 kV, 100 ns) and KING (200 kA, 40 kV, 200 ns). Radiographs of exploded foils placed in a reverse current circuit (current amplitude 80 kA) were obtained by point-projection radiography in the radiation of a hybrid X-pinch, the main load of the generator. The influence of artificial relief on the resulting explosion pattern in foils with a pronounced own structure was studied. The method of point projection radiography showed the presence of its own initial structures in foils, periodic in one or two directions [1].

Experiments have also shown that the energy deposited in the foil depends on the mutual orientation of the foils and the current flowing through the foil, which, of course, affects the structure of the blown foils [1, 2]. The choice of variants of their own structures is quite small. It can be expanded by additional application of an artificial periodic structure of arbitrary direction and scale to the foil surface. Having studied how such structures affect the explosion mode, it is possible to choose the optimal foil load option for a particular applied task.

Experiments have shown that preliminary laser engraving of the foil surface in the form of grooves (width 50 microns and pitch 50 and 100 microns) in a direction parallel to the current and perpendicular to its own structure leads to noticeable smoothing of inhomogeneities, which is an important factor in achieving high compression parameters, for example, for use for inertial fusion. The paper shows that external periodic dot engraving with a dot diameter of 50 microns and a scale of 50 and 100 microns causes the formation of periodic instabilities with a more pronounced amplitude than in foil without external influence. At the same time, the scale of instabilities formed during the foil explosion is close to the scale of the applied dots.

References

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2. T.A. Shelkovenko, I.N. Tilikin, A.V. Oginov, K.S. Pervakov, A.R. Mingaleev, V.M. Romanova and S.A. Pikuz*,* Investigation of the Nanosecond Explosion of Thin Foils, with Artificially Applied Surface Structure, Plasma Phys. Rep., 2022, 48, 1226.

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