Study OF THE RADIAL DISTRIBUTION OF Z-PINCH RADIATION USING A QUASI-FLAT-FIELD SPECTROGRAPH [[1]](#footnote-1)\*)

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One of the main tasks when working on pulse power facilities is to increase the power of a soft X-ray pulse (SXR) obtained by current implosion of multiwire arrays [1]. At the final stage of compression of such arrays, various instabilities develop. One of their main types is the magnetic Rayleigh-Taylor (MRT) instability of the outer plasma boundary. In experiments, advanced compression of some part of the mass of the wire array and the formation of trailing plasma are recorded, which at the moment of the pulse peak is located between the load axis and the initial position of the wires and shunts the current flowing through the pinch, which negatively affects the parameters of the SXR pulse - its duration and amplitude [2]. To study the parameters of the trailing plasma, we use a quasi-flat-field grazing incidence spectrograph [3] with radial spatial and temporal resolution. A distinctive feature of the spectrograph scheme under consideration is the shifted position of the entrance slit relative to the Rowland circle, which makes it possible, when the recorder is placed close to the tangent to the focusing surface at the point of its minimum distance from the center of the grating, to increase the spectral resolution due to a significant decrease in defocusing due to the off-Rowland placement of the spectrum recorder.

In [4], a method was proposed for measuring electron temperatures Te<100 eV by the ratio of the intensities of closely spaced lines of [H]-like (transition 1-2) and [He]-like (transition 1-3) carbon ions. The applicability condition for this method corresponds to the parameters of the trailing plasma [5]. In experiments with nested fiber-wire (polypropylene-tungsten) arrays and fiber (polypropylene or capron) arrays with a deposited metal layer, Z-pinch emission spectra were obtained with radial and temporal resolution. The figure shows the radial distribution of the electron temperature in the trailing plasma in an experiment with a nylon array, on which an In layer was deposited, which was determined by the method proposed in [4]. The dependence of the diameter of the radiating region on the parameters of the external cascade of nested fiber-wire array at the time of the SXR maximum was studied and it was shown that for loads optimal in terms of output power, the dimensions of the trailing mass are the smallest, which indicates a decrease in the effect of the trailing plasma on the efficiency of transporting the discharge current to the paraxial region of nested array.

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References

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