THE USE OF TRANSIENT COMPRESSION MODES OF HIGH-CURRENT Z-PINCHES TO INCREASE THE SPECIFIC CONCENTRATION OF PLASMA ENERGY [[1]](#footnote-1)\*)

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The paper presents the results of experiments to increase the specific concentration of plasma energy of high-current Z-pinches due to the use of various compression modes. Experiments were carried out with cascaded multi-wire cylindrical loads on the Angara-5-1 installation with a load current of up to 3 MA. In the experiments, loads were used, both with reduced inductance at the final stage of pinch compression, and loads allowing for the implementation of a transient compression mode from a cascade circuit to a composite Z-pinch circuit. When compressing cascade assemblies with reduced inductance at the final stage of compression, a specific power of soft X-ray radiation of the order of 5 TW/cm was obtained, which corresponds to the radiation power from a pinch of standard length 1.6 cm at the level of 8-9 TW? The specific yield of soft X-ray radiation was ~150 kJ/cm. The dynamics of load compression and the high output of the total radiated energy allow us to conclude that the magnetic field of the internal cascade plays an essential role in the interaction of the assembly cascades. It is shown that in the transient compression mode from cascade assembly to composite Z-pinch, an external assembly made of a material with a relatively low atomic number (Al) provides a high kinetic energy flux density (~5 TW/cm2), and an internal assembly of a small diameter made of a material with a high atomic number (W) can significantly increase the radiation power. Obtaining high radiation power in such a compression mode, firstly, is associated with a decrease in the time of energy transfer from lighter aluminum ions, which have a high temperature during thermalization of the accelerated outer shell, to electrons. Secondly, an increase in the radiation power is facilitated by an increase in the electron concentration in the pinch, due to the high concentration of aluminum ions.

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