PROFILING AND INCREASING THE PEAK POWER OF the X-RAY RADIATION PULSE DURING THE IMPLOSION OF NESTED ARRAYS OF MIXED COMPOSITION [[1]](#footnote-1)\*)

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We present the results of experiments with the compression of the plasma of double multiwire arrays of mixed composition and the generation of powerful soft X-ray radiation (SXR) pulses carried out on the powerful electrophysical facility Angara-5-1 at a discharge current of up to 4 MA. Based on the latest experimental data on the production rate  of various plasmas (in μg/(cm2⋅ns)) [1] and on specificities of the dynamics of plasma compression in nested arrays [2], a nested array has been designed, which makes it possible to obtain a high SXR peak power in comparison with the optimal (in terms of radiation power) designs of single and nested tungsten wire arrays. By selecting substances with different plasma production rates, it was possible to reduce the level of magnetohydrodynamic instabilities at the final stage of compression of the inner array. This made it possible to reduce the radiation pulse duration and increase the SXR power. Using implosion of nested arrays of mixed composition, consisting of plastic fibers and tungsten wires, shorter and more powerful SXR pulses with a maximum peak power  ~ 10 TW with a pulse duration *FWHM* ~ 5 ns were obtained in comparison with the parameters of SXR pulses upon compression of single tungsten arrays:  ~ 5 TW and *FWHM* ~ 10 ns. Thus, we have shown the possibility of a twofold increase in the peak SXR power during compression of nested arrays under the conditions of our experiments by optimizing their design [3]. Recent experiments show that it is possible to achieve the predicted peak SXR power limit of up to 15 TW for nested arrays of the presented design.



Time dependences of total current *I* and soft X-ray power *PSXR*.

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References

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