

LINEAR PULSE TRANSFORMER WITH PULSE REPETITION UP TO 5 HZ

V.M. ALEXEENKO¹, A. A. ZHERLITSYN¹, S. S. KONDRATIEV¹

¹IHCE SB RAS, Tomsk, Russia

A linear pulse transformer is successfully used for charging an intermediate storage (capacitance with water isolation or inductive) [1,2]. Compared with the more common Marx generators, the linear pulse transformers have some advantages: significantly less high-voltage isolation volume and simplified monitoring and maintenance of capacitors and switches of the storage. Article [3] showed the possibility of using a linear pulse transformer for applied tasks. However, in this case, it is necessary to implement the frequency mode of operation with acceptable stability.

This work presents the design and results of the study of a linear pulse transformer (the transformer below) with air insulation at atmospheric pressure. Distinctive features of this transformer are the frequency mode of operation, the absence of a liquid dielectric in the insulation of the transformer, the placement of a capacitive storage inside the case (inductor) and its direct connection to the primary loop without the use of high-voltage transmission cables. The capacity of the transformer storage is 150 nF, the charging voltage is up to 80 kV, and the stored energy is up to 480 J. The transformer allows about 60% of the stored energy to be transferred to a matched load (5–7 Ohm) in a characteristic time of about 1 μ s. At a high-resistance load, the transformer generates a voltage pulse with a rise time of 100 ns and an amplitude close to twice the charging voltage. The increase in output voltage and power is realized by connecting several transformers in series. The experimental results show possibility of the frequency mode of operation with a pulse repetition of 1–5 Hz and with output pulse jitter at the level of 20 ns.

The work was performed under State Assignment of the Ministry of Science and Higher Education of the Russian Federation (No. FWRM-2021-0001) and with the support of the Russian Foundation for Basic Research (No. 19-08-00115 a).

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