

COMPACT PULSE POWER GENERATOR AS A SOURCE OF ENERGY FOR A PLASMA GUN*

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Ten years ago, at the Institute of High Current Electronics SB RAS in Tomsk a new method for the formation of a reusable point source of soft X-rays was proposed as an alternative to the X-pinch. This method was called PZ-pinch (Point Z-pinch) [1, 2]. In contrast to the X-pinch, the plasma of the PZ-pinch is preliminarily produced and then injected into the high voltage gap of pulse power generator during the operation of a high-current arc discharge.

The work is devoted to a new compact pulse generator designed as a source of power for a plasma gun. It was designed and created to replace the pulsed generator based on the IK-50-3 capacitor (3 μ F), which we used earlier. The IK-50-3 capacitor provided a current pulse with an amplitude of 70 kA and a current rise time of 1 μ s when operating on an arc. Its operating voltage was 20 kV [2]. However, this capacitor has impressive weight (120 kg) and size (31x31x67 cm³) parameters. In addition, the potential energy storage of the IK50-3 capacitor is excessive for plasma gun, which we use as part of a low-scale XPG-3 current generator to form PZ-pinch.

The new generator is based on a 1 μ F capacitor-switch assembly (Fig. 1a) of our own design [3, 4]. The dimensions of the pulse generator are \varnothing 30x30 cm, which is significantly smaller than its predecessor. The operating voltage of the new generator is 25 kV. It provides an arc current amplitude of 120 kA with a rise time of 500 ns. The external view of the generator is shown in fig. 1b. Experiments have shown that the power of the new generator is sufficient to form a bright point source of soft X-ray radiation based on the PZ-pinch in a wide range of linear pinch masses.

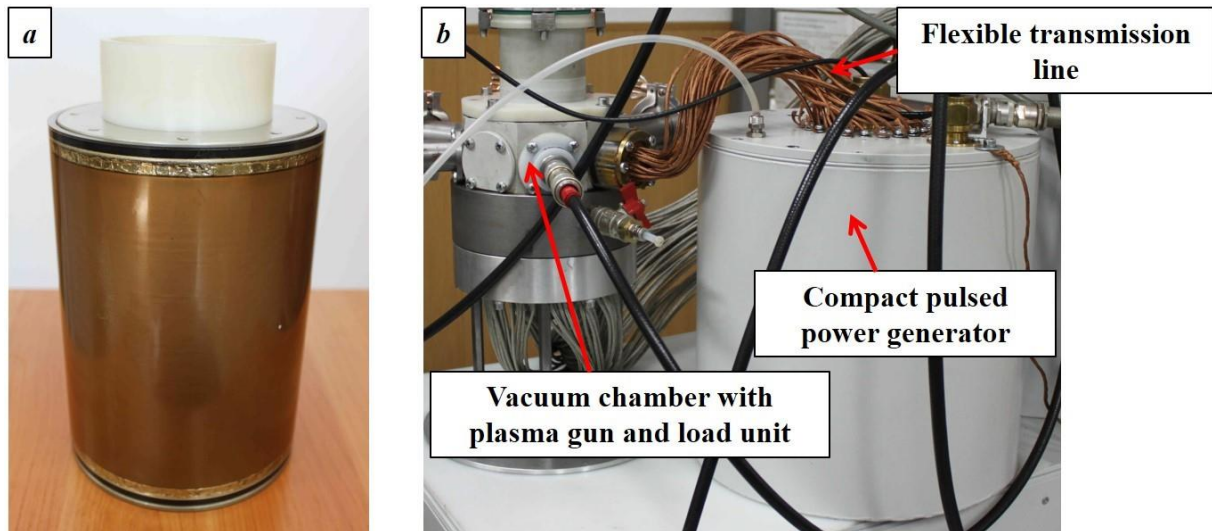


Fig. 1. External view of the capacitor-switch assembly (a) and the compact pulse power generator (b).

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