

FORMATION OF BIPOLAR PULSES OF VARIOUS DURATIONS IN A CIRCUIT WITH ONE SPARK GAP*

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High-voltage bipolar nanosecond pulses are used to excite antenna arrays of electromagnetic UWB radiation. The spectrum of the emitted pulse depends on the duration of the bipolar pulse and can be expanded if the antenna array is synchronously excited by bipolar pulses of different durations. Works of this kind were carried out at the IHCE SB RAS. Four-channel formers were created in combinations with pulse durations of 0.5; 1; 2 and 3 ns [1–3]. The scheme for the formation of bipolar pulses was rather complicated in tuning: up to 9 spark gaps were used, located in 5 independent high-pressure gas volumes. This report proposes a new scheme for a four-channel bipolar pulse former with durations of 1 ns (2 channels) and 2 ns (2 channels). A significant difference from the above-mentioned four-channel former circuit is that only one high-pressure spark gap is used in the circuit. The advantages of the circuit are also the ease of setting the circuit, more stable amplitudes and durations of bipolar pulses, tight synchronization of pulses on the leading edges. The original scheme of the former and the experimental bipolar pulses are shown in Figure 1. The forming lines FL₁ - FL₈ were charged at a frequency of 100 Hz from the Sinus-160 generator. When the spark gap S was actuated in the transmission lines FL₉ - FL₁₂, loaded with matched loads R, bipolar pulses with durations of 1 and 2 ns with an amplitude of up to 90 kV were formed. Forming lines and a multichannel spark gap are located in a nitrogen atmosphere at a pressure of 40 atm. The output bipolar pulses were recorded by coupled-line dividers installed in the transmission lines. The electrical insulation of the transmission lines is SF₆ gas at a pressure of 4 atm.

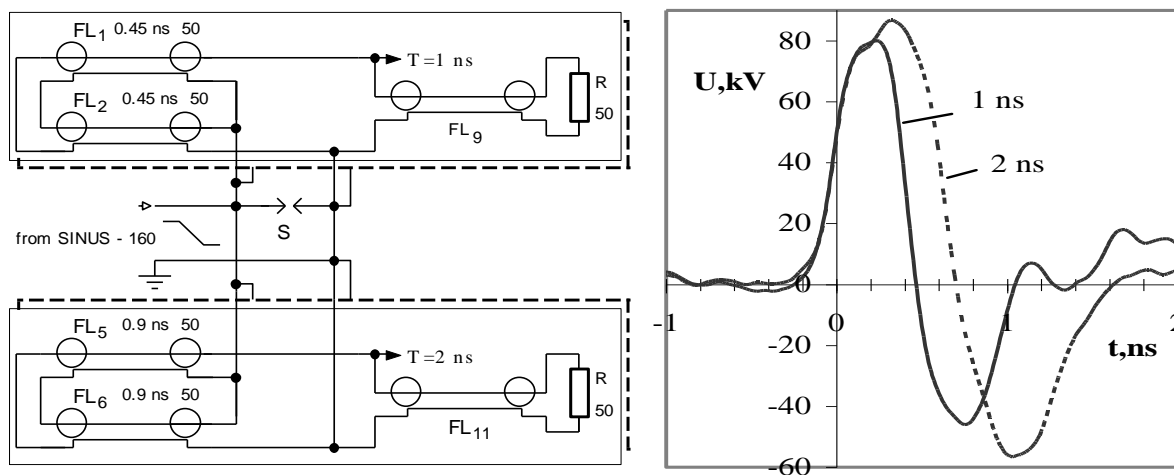


Fig.1. Schematic diagram of a four-channel shaper and experimental bipolar voltage pulses

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