FORMATION OF HIGH-VOLTAGE PULSES FOR THE POWER SUPPLY OF TECHNOLOGICAL ACCELERATORS AND TEST STENDS

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For scientific and applied problems, various electron accelerators and various test stands were created and operated at the NSC KIPT [1]. The research into electron beams of different configuration and intensity is connected with the beam usein high-voltage pulse microwave electronics, accelerator engineering for modification ofmaterial surfaces, etc. The set of works carried out to tune the parameters and characteristics of the beam makes it possible to optimize the tuning of the accelerator. Thus, as a result of modernization, the installation will allow a wide range of research, both for scientific and applied purposes.

High-voltage modulators are among the most important and energy-intensive units of a technological accelerator or test stands. The main and most energy-intensive elements of the modulator are the PFN, the thyratron switch, the pulse transformer for high-voltage power supply of the amplifying klystrons, and the klystron. Setting of the parameters of all elements, matching of wave impedances, reduction of stray fields in the pulse transformer and tuning of the PFN will increase the efficiency of the pulse modulator and its energy efficiency.

The influence of the pulse transformer on the shape of the voltage pulse is studied. Acceptable forms of load voltage and klystron current pulses for operating accelerators are obtained. The bevel of the top was ± 1%. The pulse front was 0,9...1,1 μs, the decline was 1.5 μs, the pulse duration was 3...5,5 μs. Thus, the rectangularity of the pulse is ~ 80%. For the use of a circuit with a pulse transformer, this is quite a good indicator, but with the help of additional adjustment of the cells of the PFN, it is possible to improve the rectangularity factor. For example, the duration of the pulse front can be reduced by reducing the inductance of the supply contacts, which represent an additional inductance of the first cell of the PFN [2]. The operation of the pulse modulator in the linear mode of operation and in the saturation mode of the transformer core has been studied. An assessment of the influence of the parameters of the installation units on the output signal was carried out.

Literature:

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