

Modulation and pulse modes of operation of end and magnetoplasmodynamic accelerators

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A circuit for controlling the discharge current of a magnetoplasmodynamic accelerator based on the Morgan scheme is considered. It is shown that theoretically the operating mode of the accelerator, depending on the parameters of the circuit, can be stationary, modulation, and pulsed. The necessary condition for the operation of the accelerator in the periodic mode is found. Calculations of the pulse shape of the discharge current are carried out. The condition for the transition from the modulation regime to the pulse regime is found. The dependences of the modulation depth (for the modulation mode) and the duty cycle (for the pulsed mode) on the period of operation of the circuit for various values of its parameters are numerically studied. The minimum possible values of the circuit operation period are established, as well as the maximum possible values of the duration of the stationary current stage. The experimentally observed pulse shapes were compared with the calculated ones.

Keywords: plasma jet, plasmoid, magnetoplasmodynamic accelerator, pulse mode, end Hall engine, discharge current, plasma flows, pulse shape, Morgan circuit, duty cycle.

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