investigation of current layer motion in coaxial plasma accelerator [[1]](#footnote-1)\*)

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Plasma accelerators are currently successfully used for various tasks of controlled thermonuclear fusion, such as fuel feeding of devices with magnetic plasma confinement during discharge, pre-ionization of plasma devices in which discharge breakdown is difficult [1], irradiation of materials of the first wall of a tokamak. In this work, we considered a plasma accelerator with coaxial electrode geometry, 160 μF capacitor storage and a voltage across the electrodes up to 5 kV [1]. Plasma density in outlet of accelerator was 1016 cm-3, velocity 80-100 km/s.

A theoretical model for describing the process in a pulsed accelerator was formulated in [2]. Electrodynamic acceleration model was considered, in which the plasma was represented in the form of a conductive bridge with concentrated mass, accelerated under the action of an electrodynamic force. However, this model is not always implemented in practice. As a rule, after the initial phase of the discharge the current bridge is stratified and localized at the entrance and outlet of the accelerator, which prevents the effective acceleration of the plasma [3]. Knowing the position of the current sheet during the discharge, it is possible to increase such characteristics of plasma jet as velocity. Increase in the directed kinetic energy of jet free of impurities is best accomplished through increase in its velocity. In addition, the inclination of the current bridge relative to the electrodes will make it possible to determine the plasma acceleration mechanism into accelerator channel. An increase in elongation of current bridge deteriorates the traction characteristics of jet. Increase in plasma jet velocity is possible while maintaining the mode and conditions in coaxial accelerator, under which the discharge will be perpendicular to the magnetic field created by the electric current.

Earlier [3], magnetic probes installed inside accelerator were used to register the motion of the current layer. However, probes location into accelerating channel could lead to plasma disturbances and distortion of measurements. Angle determination of current sheet inclination relative to the lines of force of the magnetic field was carried out by diagnostics based on LED current sensors. Sensors were located on the surface of outer electrode and also inside the central electrode of accelerator. This method turned out to be simple, reliable and did not affect flow of discharge current through electrodes.

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