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The pulsed plasma accelerator with focusing electrodes experiments

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Today, the efforts of scientists to solve problems of fusion associated mainly with magnetic systems, primarily with tokamaks and etc. One of alternative method is plasma focus (PF) installations, based on the focusing of the plasma beam in a small area with high density. Using of coaxial pulsed plasma accelerator equipment, the authors had aim of creation of focus reactor with current about 1 MA . In this work, the experiments are conducted on the basic of pulsed plasma accelerator “CPA-30” with a new focusing electrodes from massive copper cylinders. The experimental device consist of vacuum chamber of Mather type, the capacitive energy bank 75 microF, 50 kV , vacuum switch and current leads.

First, the discharge current dates is obtained when the charging voltage of the capacitor bank variety from 6 to 20 kV. Then we interpret the current curves using of electrodynamic models and calculations. Experimental results show that the discharge current does not exceed 300 kA even at the maximum charge of 30 kV.

Analysis of experiments and calculations show, that the curve of the discharge current of a new PF installation has a period 14 microsec. It is equal to the previously obtained values for the accelerator CPU-30, which is determined by the inductance of the vacuum switch. Current limit amplitude, here, apparently due to the size of the electrodes so as to form a focus on a large scale requires more current. Therefore, to increase the discharge current is requiring increasing the capacity and voltage, or reducing the electrodes size. With existing energy equipment, the second way seems more acceptable. On this way, now we are development the device with small focus electrodes and without vacuum switch.

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