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Recent results of the Filippov-type PF experiments performed at Kurchatov Institute

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The main content of the studies on PF-3-facility was the experiments with various mediums as a plasma source. The facility studies as the driver for magnetic compression of liners are going on. Experiments with wire arrays have been achieved at filling discharge chamber with deuterium under the pressure 3-4 Torr. Compression dependence on wires number was investigated. The better result was achieved with liner made of 60 tungsten wires, 6 μm in diameter (linear mass 0.33 mg/cm). Liner compression is accompanied by the pulse of X-ray radiation. In case of 40 wires of same diameter, despite of smaller linear mass, compression is characterized by enough long-lived (~ 300 ns) stage, during which the wires remain fixed after contact with the current sheath. Practically it was not observed the liner compression in case of 24 wires.

In cooperation with Czech Technical University experiments with CD_2 fiber located on the discharge system axis were done. Fiber pre-heating by the radiation of the collapsing current sheath was confirmed in experiments with neon as a working gas: initial fiber diameter increasing in 2-3 times was observed on the shadow pictures. However neutron radiation was not observed in these shots. At the same time the neutron output at level ~ $5 \cdot 10^6$ neutron/shot ±50% was confidently registered in the shots with argon. The neutron radiation output depends on symmetry of the plasma sheath convergence to the fiber.

The studies of the dense high-temperature plasma interaction with the condensed dispersion mediums (dust) are going on. The different modifications of the dust source were tested and dust target parameters were determined with the special testing stand at the conditions maximally closed to the conditions of real experiments. The experiments have shown the possibility of the effective control on the final discharge stage. Pinch dynamics dependence on dust target parameters was explored. The modes with enhanced MHD-stability are found in the shots with neon and dust fraction of fine-disperse (2-10 μm) Al_2O_3 powder.

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