Dynamics of implosion of wire array onto deuterated TaRGET

1Aleksandrov V.V., 1Frolov I.N., 1Grabovskii E.V., 1Griţsuk A.N., 1Ivanov M.I., 2Kalinin Yu.G., 2Korolev V.D., 1Lauhin J.I., 1Medovshchikov S.F., 1Mitrofanov K.N., 1Olejnik G.M., 2Smirnova E.A., 1Volkov G.S., 3Volobuev I.V.

1Troitsk Institute for Innovation and Fusion Research, Pushkovykh Street 12, Troitsk,
 Moscow, 142190, Russia
2National Research Center "Kurchatov Institute", Kurchatov Square 1, Moscow, 123182,
 Russia
3Lebedev Physical Institute of the Russian Academy Sciences, Leninski Avenue 53, Moscow,
 119991, Russia

The implosion of wire array on the internal deuterated cylinder was investigated on the Angara-5installation (3.5 MA, 100 ns). The a arrays of various configurations with diameter of 12 and 20 mm were made on the basis of aluminum wires and graphite fibers with a diameter of
15 and of 30 µm, the mixed arrays consisting of aluminum wires and nylon wires with a diameter of 25 microns and arrays from nylon wires with dusting of aluminum 1 micron thick were used. The quantity of wires changed from 10 to 30. The internal cylinder was made of deuterated polyethylene with density of 0.045–0.3 g/cm3 and with a diameter of 1–3 mm. For measurement of parameters of plasma in Z-pinch 10 frame camera (the exposure frame 2 ns), an optical streak camera, the time -integrated x-ray pinhole camera, vacuum photoemission detectors, a crystal spectrograph, neutron detectors were used. It was established that dynamics of implosion of plasma, formation of the hot spots which are sources of neutrons depends on configuration of load: diameter of arrays, quantity of wires (fiber), diameter and density of the deuterated cylinder. The most efficient compression and high parameters of plasma ( compression ratio, temperature), and also the maximum neutron output (2.6 × 1010) was observed in experiments with the array with a diameter of 12 mm executed from aluminum wires in which the deuterated cylinder with a diameter of 1 mm with a density of 0.07 g/cm3 was located.