Control of ablation pressure during direct irradiation of low-density targets with laser pulse

Danilov A.E.[1,2,3,@], **Mitrophanov E.I.**[1], **Derkach V.N.**[1], **Starodubtsev P.V.**[1], **Voronin A.Yu.**[1] **and Vylomov L.P.**[1]

[1] Federal State Unitary Enterprise "Russian Federal Nuclear Center—All-Russian Research Institute of Experimental Physics, Mira Avenue 37, Sarov, 607188, Russia

[2] Department of Physics, Lomonosov Moscow State University, Leninskiye Gory 1 Bldg 2, Moscow, 119991, None

[3] Sarov Branch of the Lomonosov Moscow State University, Parkovaya 8, Sarov, 607328, None

[@] oefimova@otd13.vniief.ru

The results of experiments on increasing the ablation pressure under direct laser irradiation of two-layer targets with low-density ablator are proposed. A series of experiments were conducted at the MIK stand. To irradiate targets, 0.527 μm long radiation from 8 laser channels with an energy of $\approx$ 4 kJ each was used, the pulses had a trapezoidal shape with half-height duration of $\approx$ 4.3 ns. The irradiation spot was $\approx$ 900 μm for the experiments given, according to the pinhole readings. The two-layer targets were made of low-density a carbon-used ablator with density of 44 mg/cc and step indicator made of copper. The ablator was placed in fluoroplastic cylinder 800 μm long and 1 mm in diameter, which prevented lateral unloading of material. The shock wave velocity was measured using a photochronographic technique in copper step indicator with a base thickness of 40 μm and two steps of 20 μm. The maximum velocity in the indicator was 34.2 km/s. which corresponds to a pressure of 77 Mbar. The obtained results are in good agreement with one-dimensional calculations. The study was carried out within the framework on the scientific program of the National Center for Physics and Mathematics (project "High Energy Density Physics. Stage 2023–2025").