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PRESSURE TRANSFER DURING THE PROPAGATION OF A LASER-INDUCED SHOCK WAVE THROUGH A MULTILAYER FLAT TARGET *)

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The work presents the results of computational and theoretical studies of the propagation of a laser-induced shock wave through a system of flat layers of matter. The main attention is paid to the impact on a multilayer target of a powerful laser pulse with an intensity of about 10^{13} W/cm^2, typical for experiments performed on the «Luch» laser facility (RFNC VNIIEF) [1]. The results of two series of calculations are presented. In the first case, a system of solid elements separated by air gaps simulating a porous substance is located on the path between the laser and the solid target. In the second case, this system is replaced by an equivalent homogeneous medium with a density equal to the average density of a porous substance. Numerical calculations performed using the DIANA code (one-dimensional Lagrangian program) [2], which provides a numerical solution of a system of continuum equations in a two-temperature approximation, taking into account the absorption of laser radiation, energy release in thermonuclear reactions and the transfer of plasma intrinsic radiation.

The work investigates the features of pressure transfer during the propagation of a laser-induced shock wave from a layered system into a medium with solid density. The possibilities of using porous media in targets intended for studying the equation of state of matter and initiating a thermonuclear reaction in direct irradiation schemes in laser fusion are discussed.

References

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