THE DIRECT DRIVE TARGET FOR A LASER PULSE OF A MEGAJOULE SCALE

N.N. Demchenko[1], S.Yu. Gus'kov[1], P.A. Kuchugov[1,2], V.B. Rozanov[1], R.V. Stepanov[1], G.A. Vergunova[1], R.A. Yakhin[1], and N.V. Zmitrenko[2]
[1]Lebedev Physical Institute of RAS , Moscow, Russia
[2]Keldysh Institute of Applied Mathematics of RAS, Moscow, Russia
pkuchugov@gmail.com

At present, significant differences remain unclarified between the characteristics of the compression of thermonuclear targets, measured at existing laser facilities and received from appropriate numerical calculations. Apparently, during the simulation some factors [1] remain not fully accounted, and their influence on the symmetry of compression results in a much more intensive development of hydrodynamic instabilities than is evaluated in mathematical models. At the same time, there is one more reason for such discrepancy. It consists in uncontrolled deviations of the laser pulse parameters or target configuration from those anticipated in the model values, which, in most cases, can reduce the efficiency of compression and combustion of thermonuclear target.

One way to overcome these factors which reduce the target efficiency is to find the target design that is less sensitive to the development of hydrodynamic compression instabilities and the impact of uncontrolled variations of target's parameters and characteristics of the laser pulse.

In this paper, we analyze the results of one-dimensional calculations of direct-drive targets implosions driven by laser pulse with an energy of about 2 MJ [2,3]. Many variants of absorbed energy distributions by the target surface which result from particular target irradiation scheme are considered. The target design which provides relatively high (up to 20) thermonuclear gain has been chosen. Sufficient stability of the compression, with respect to the hydrodynamic instabilities development at the stage of target deceleration, is confirmed by some two- and three-dimensional calculations.

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