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PLASMA DYNAMICS SIMULATION FOR TARGETS WITH LOW-DENSITY ABSORBER HEATED BY TWO LASER BEAMS *)

[2]Bai A.A., [2]Gasilov V.A., [1]Gus'kov S.Yu., [1]Yakhin R.A.

[1]P.N. Lebedev Physical Institute RAS, guskovsy@lebedev.ru
[2]M.V. Keldysh Institute of Applied Mathematics RAS, bay.aa@phystech.edu

During the last few decades, the effect of intense laser pulses on targets included a layer of low-density substance - an "absorber" with an average density from several units to several tens of mg/cm^3, has been actively studied. Interest in the use of such materials is caused by possible applications for creating bright sources of X-ray radiation, generating energetic electrons and ions, and using low-density absorbers to equalize temperature fields in targets when heated by several laser beams [1, 2].

The present work concerns with numerical modeling performed using adaptive difference grids following the method presented in [3]. We studied the heating of a flat composite target (a low-density absorber placed on aluminum base) by two laser beams. Preliminary simulations performed with parameters corresponding to experimental conditions [2] show that the developed numerical code can be used for predictive modeling of plasma dynamics when a target is heated by several laser beams. Numerical experiments pertinent to the main problem were carried out with the heating of targets in which the absorber material has a uniform or stochastically perturbed initial density. Calculations in a three-dimensional formulation of the problem on adaptive grids provide, even when using a relatively simple adaptation criterion based on the magnitude of the density or temperature gradients of the substance, a significant (by one or two orders of magnitude) expansion of the range of scales of reproducible details of the structure of the plasma flow, which makes it possible to obtain refined quantitative data on propagation of hydrodynamic and thermal waves in the material and homogenization of laser plasma.

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