SIMULATION OF X RADIATION TRANSFER IN A SPHERICAL BOX-CONVERTER BY A CODE TIGR

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The efforts to optimize the setup of ICF experiments through calculations are taken all over the world. At RFNC – VNIITF, such systems are simulated using, inter alia, a complex TIGR [1] of 2D hydrodynamics codes with a technique TOM [2] for solving radiation transfer in different approximations. The complex implements a 3D model of laser radiation absorption in the geometrical optics approximation [3]. TIGR was earlier used to study the influence of the spectral effects of radiation transfer on the development of short-wave perturbations in indirect-drive shell targets [4]. Paper [3] discussed TIGR calculations for NIF experiments with a spherical target in a cylindrical box-converter.

This paper presents calculated results for the field of thermal X radiation in a box with circular converters heated from outside by laser beams of a megajuole facility. The converters cut into the walls of the box are disks of a high-Z low-density material (foam) semitransparent for their thermal radiation. In the center of the system, there is a spherical target that must be irradiated rather uniformly by radiation from the inner surfaces of the converters and the box walls. The main advantage of this new box with the converters proposed in [5] is the absence of problems that arise in the traditional indirect-drive target designs with the entry of laser radiations into the box through holes [6]. The geometry of the box-converter is three-dimensional. That is why different setups for TIGR calculations were considered. They included calculations for a conic region with a solid angle of $4\pi/6$ corresponding to a spherical box with 6 circular converters. Boundary conditions on the fixed conical surface provided for zero heat flux. TIGR calculations in grey and spectral kinetic approximations agree with the analytical estimates presented in [5].

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