development of two- and three-dimensional NUMerical codes for modeling of the imposion of thermonuclear targets

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Two direct-driven targets are considered in this paper, one of which [1] is intended for use on a Russian laser facility being constructed (RFNC-VNIIEF, EL~2.8 MJ, λL=0.527 μm, 192 beams), the other [2] at OMEGA facility (LLE of the University of Rochester, EL~20 kJ, λL=0.351 μm, 60 beams). Numerical modeling of their compression and burning at the stage of DT-shell deceleration is carried out using 2D code NUTCY in the R-z geometry and 3D code ICFM3D in the Cartesian geometry. Compared with previous versions of the NUT code, the physico-mathematical model used was supplemented by taking into account the possible difference in ion and electron temperatures (two-temperature model) and the transport of α-particles produced as a result of fusion reactions in the one-group diffusion approximation. The performed comparison with the results [3,2] of the corresponding one-dimensional calculations using the DIANA, SND and LILAC programs, as well as the 3D calculation of the ASTER program, allows one to speak of a good agreement of the numerical data between themselves in a spherically symmetric formulation.

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References

1. Bel'kov S.A., Bondarenko S.V., Vergunova G.A. et al., JETP, 121, 4, 686-698, 2015.
2. Igumenshchev I.V., Goncharov V.N., Marshall F.J. et al., Phys. Plasmas, 23. 052702, 2016.
3. Demchenko N.N., Dolgoleva G.V., Gus'kov S.Yu. et al., JPCS, 907, 012019, 2017.