An influence of mixing processes on the decrease in the neutron yield under laser thermonuclear target compression

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Abstract.

The present work is devoted to studying the hydrodynamic instabilities and turbulent mixing with an aim to improve the compression and burn of thermonuclear fusion targets.

The performed numerical simulations allowed one to find an answer to an important question of the mixing influence on the parameters of thermonuclear target compression, depending on the initial conditions. Basing on the consideration of the instability development in plane and spherical simulations, and making use of the evolution model of the instability development, the authors proposed for the first time the analytic formulas, which allow one to describe the mixing zone development with account of the initial conditions (the spectrum, the perturbation amplitude, etc). An important advantage of the obtained formulas is a possibility to use them in further simulations of the mixing processes in a rather wide range of physical parameters. Note that the simulations are modeling the essentially different regimes, since in similar gas-dynamic problems the fundamental properties of gas dynamic similarity are fulfilled. The results from numerical simulations and their processing, as well as the obtained relationships allowed one to answer the question on the dependence of the mixing parameters, such as the amplitude, perturbation phase, the number of perturbation harmonics, on the initial conditions, and this important for the ICF problem.