Instability development in double shell ICF target compressed by high energy laser pulse

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One of the main obstacles for achieving thermonuclear ignition in compressing ICF laser targets is the instability development caused by shortcomings in the manufacture of the targets. The experimental data, acceptable for testing of computational codes, were obtained for the two-shell target used in SGIII [1] facility.

Numerical code Focus [2] is carried out to simulate the target compression. The scheme of indirect irradiation with hohlraum temperature dependence [1] was analyzed.

Calculations without the initial geometric perturbation of the target shells show an increased number of neutrons compared to the experimental data. A series of two-dimensional calculations was performed with the relative value of the shell perturbation, defined as the ratio between the perturbation amplitude and the radius of the shell, varied from 0.01% to 0.2%. The perturbation which gives the value of neutron output closest to the experimental data was determined. The next characteristics were obtained: fraction of energy per vortex component of the kinetic energy, the width of the mixing zone as a function of time, the degree totally developed turbulence, etc.

References

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