

Simulation of 3D-deposition energy with wobbling beam illumination in directly driven heavy ion fusion

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Abstract

Uniformity of heavy ion beam (HIB) illumination is one of the key issues in HIB inertial confinement fusion (HIF). Deviation from fuel implosion symmetry should be less than a few percent in order to compress a fuel sufficiently and release fusion energy effectively. A non-uniformity of ion beam irradiation on a direct-driven heavy ion fusion (HIF) pellet was studied numerically in our previous paper (*Plasma Sci. Technol.* 2011, Vol. 13, 44). A more particular analysis of that irradiation scheme is done in the present paper using Code OK3 . This code is an upgrade of OK1 including an important capability of wobbling beam illumination. The wobbling beam introduces a unique possibility for a smooth mechanism of inertial fusion target implosion, so that sufficient fusion energy is released to construct a fusion reactor in future. The 3D- deposition energy profile of lead beams is calculated in spherical and elliptical targets after and before using wobbling beam illumination. The results show that rotating HIB illumination onto a fuel target reduces effectively non-uniformity of HIB illumination.

Keywords: Ion beam illumination, inertial confinement fusion, Energy deposition, wobbling beam, fuel target