8th Asia-Pacific Conference on Plasma Physics, 3-8 Nov, 2024 at Malacca

Progress in Shock Wave Diagnosis Technology Based on Velocity Interferometers for Laser Inertial Confinement Fusion

Feng Wang, Yulong Li, Zanyang Guan

Laser Fusion Research center, China Academy of Engineering Physics
e-mail (speaker):wangfeng7566@163.com

In the laser driven inertial confinement fusion (ICF) experiment, it is necessary to compress the mm scale target more than 30 times in a spherically symmetric and low entropy manner, forming a core of about 50 μm high temperature and high density plasma hot spot, and then ablate the peripheral fusion fuel to support combustion. The research team has developed a series of velocity interfere system for any reflector (VISAR) technology to characterize the driving symmetry of the multi angle shock wave，including linear VISAR, two-axis VISAR, wide-angle VISAR, compressed ultrafast photography(CUP)-VISAR technology. Line VISAR technology can diagnose the shock wave velocity of ICF implosion compression. Two-axis VISAR can diagnose P2 asymmetry.

Wide angle VISAR can diagnose three-dimensional compressive symmetry. CUP-VISAR can obtain a high spatiotemporal resolution continuous two-dimensional VISAR technique for diagnosing instability. In the early stage of implosion compression, linear and biaxial VISAR technologies were mainly used, while in the flight phase of implosion compression, two-axis and wide-angle VISAR technologies were mainly used. The shock wave speed regulation experiment mainly uses CUP-VISAR technology. These technologies can provide unique compression information at different stages of ICF, which is of great significance for the control of thermonuclear fusion.