EXPERIMENTAL PROGRESS OF QUASI-ISENTROPIC COMPRESSION UNDER DRIVE CONDITION OF SHEN GUANG-III PROTOTYPE LASER FACILITY

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In this report, the experimental results of isentropic compressions with different drive technique on Shen Guang-III prototype laser facility are introduced. These techniques include plasma jet drive with reservoir target in indirect-drive and direct-drive, ablation drive with long pulse laser indirect-drive and direct-drive.

The isentropic compression can be obtained with reservoir target in laser direct-drive and indirect-drive experiment. The free surface velocity and interface velocity are the two important parameters in isentropic compression experiment. The efficiency with reservoir target is lower than that in the isentropic compression experiment with long pulse laser direct-drive. With the sandwich target added with high Z or middle Z material, the isentropic compression pressure can break through the limitation of 200GPa. With the CH/Cu/CH reservoir target, the isentropic compression pressure can reach to above 300GPa on Shen Guang-III prototype laser facility.

As a new technique, the isentropic compression with long pulse laser direct-drive, which has the potential to obtain ultra-high pressure, is analyzed on Shen Guang-III prototype laser facility. The interface velocity on Al/LiF is achieved with three steps. The blank effect is provided and analyzed. The theoretical model, target designing, experimental results, key technique, experimental characteristics and experimental data are analyzed in detail. The compression pressure above 400 GPa on the loading surface is obtained with experimental data and processing program, which is the highest pressure achieved to date. After comparing the apparent particle velocity with the true particle velocity, the dynamic correction curve can be obtained to achieve the real particle velocity, which is more accurate. The improving direction is provided, which will provide the important information. These experimental data and design will give the valuable reference for this field.

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