

PLASMA-MIRROR-BASED LASER PULSE CONTRAST ENHANCEMENT SYSTEM FOR MULTITERAWATT LASER FACILITY

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Currently, most laser systems with ultrashort pulse duration and high peak power are built using chirped pulse amplification technology. One of the disadvantages of technology is the presence of prepulses, which change the surface of the target before the arrival on the main laser pulse. Reducing the intensity of prepulses and increasing the temporal contrast is an important technical challenge, especially in a view of continuing growth of research laser facilities power. One of the most effective ways to solve this problem is the use of plasma mirror technology [1].

We have developed a laser pulse contrast enhancement system (CeS) in the base of the double plasma mirror [2] for a 200TW femtosecond laser ($\lambda = 0.8 \mu\text{m}$). The CeS is installed in the vacuum chamber between the laser pulse compressor and the target chamber. The design of the system allows the adjustment of the main laser pulse energy density on plasma mirrors in the range from 10 J/cm^2 to 1000 J/cm^2 . The alignment of the CeS optical elements and the precise positioning of the target at the focus of the laser pulse inside target chamber is carried out by using an optical system of own design with a CW laser ($\lambda = 0.53 \mu\text{m}$).

We report optical schemes of the CeS and the optical alignment system and present the results of the first experiments on the interaction of the high-contrast laser pulses with solid targets at intensities of up to 10^{20} W/cm^2 .

References

1. **Wittmann, T.** Towards ultrahigh-contrast ultraintense laser pulses – complete characterization of a double plasma-mirror pulse cleaner [Text] / T. Wittmann, J. P. Geindre, P. Audebert, R. S. Marjoribanks, J. P. Rousseau, et al. // Review of Scientific Instruments. – 2006. – Vol. 77. – 083109 p.; doi: 10.1063/1.2234850.
 2. **Patent RU 2775443 C1.** Device for modulation of powerful laser radiation, 02.03.2021.
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