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REFRACTION CHANNELING OF AN IONIZATION WAVE PRODUCED BY THE INTERACTION OF A LASER BEAM WITH A SUBCRITICAL PLASMA *)

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This paper considers the classical problem of propagation of a laser-induced ionization wave in plasma with a density less than the critical [1] for the case of a finite laser beam radius. In this case, it should be expected that the nature of the propagation of the ionization wave will be significantly complicated due to the influence of a number of effects and, first of all, effects associated with the propagation and absorption of laser radiation. Based on computational and theoretical studies, the effect of channeling the propagation of the ionization wave in the central paraxial region of the plasma and the effect of refractive self-focusing of the laser beam due to the direction of the density gradient caused by the hydrodynamic motion of the plasma were discovered. It is shown that the longitudinal velocity of the ionization wave in the channeling region exceeds the wave velocity in the peripheral region of the plasma, located at distances comparable to the radius of the laser beam, due to heating of the plasma in the paraxial region by refractive radiation of the beam.

The results obtained are of practical importance for problems related to the study of the propagation of laser radiation in gaseous media, as well as the use of low-density media in modern schemes for irradiating laser thermonuclear targets.

References

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