Modeling of Powerful Laser Pulses Interaction with Solid Targets

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The new model and hydro-electrodynamic code are elaborated to describe the interaction of powerful laser radiation with solid targets. The self-consistent physical model describes the laser energy absorption and reflection, electron-ion temperature relaxation, ionization, recombination, heat conductivity and plasma expansion. A new wide-range two-temperature equation of state, describing nonequilibrium heating of target from solid state to hot plasma, is used for determination of the thermodynamic properties of heated matter. The system of hydrodynamic equations is solved using the high-order Godunov scheme in Eulerian coordinates in 2-D cylindrical or plane geometry. The adequate description of the laser absorption and heat transfer in wide range of plasma parameters makes it possible to get the important information on transport coefficients and absorption ability of nonideal plasma by detailed comparison with current experiments using pump probe method and/or spectroscopic measurements.