

Impact of ultra-short laser pulses on metals and two-temperature hydrodynamics

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Over the considerable difference in the masses of electrons and ions, the characteristic time of electron–electron relaxation τ_{ee} (and ion–ion relaxation τ_{ii}) is significantly less than that of electron–ion one τ_{ei} . This allows at intermediate times $\tau_{ee} \ll \tau \ll \tau_{ei}$ electron and ion subsystems to be considered as quasi-equilibrium, with their own temperatures T_e and T_i , which may differ significantly $T_e \gg T_i$ [1]. At higher intensity of radiation or exposure to heavy metals, the substance begins to move noticeably at a substantially two-temperature stage. This makes it necessary to consider the equations of two-temperature thermodynamics [1] together with the equations of motion within a single two-temperature hydrodynamics [2]. The effect of two-temperature on laser ablation, vibrations of a metal film on a substrate and its delamination, etc are considered [3].

- [1] Anisimov S I, Kapeliovich B L and Perel'man T L 1974 *Sov. Phys. JETP* **39** 375–377
- [2] Anisimov S I, Zhakhovskii V V, Inogamov N A, Nishihara K, Petrov Yu V and Khokhlov V A 2006 *J. Exp. Theor. Phys.* **103** 183–197
- [3] Khokhlov V A 2024 Two-temperature hydrodynamics under the action of ultrashort laser pulses on solid targets Doctoral thesis Landau Institute for Theoretical Physics RAS Chernogolovka