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Titel: Laser Ablation of Metals: New Developments.

Abstract:

Laser processing of materials is very important in industry and medicine. The application of femto-second laser pulses is challenging for the physical modelling of the process due to the non-classical behavior of the electron gas which dominates for example the heat conductivity.

We start from a general introduction to the problem and describe the combination of molecular dynamics and continuum description of the heat balance equations in a so-called two temperature model for electrons and atoms.

Then we apply the combined model to the simulation of homogeneous samples. We determine the importance of the three parameters involving electrons, namely heat conductivity, heat capacity and electron-phonon-coupling. We talk about an extended model taking a finite electron relaxation time into account. We study pulse sequences to determine the best temporal shape of the pulses.

In simulations of inhomogeneous irradiation we determine the properties of the ablation plume quantitatively.

The presentation is finished with an outlook and a short account on the present activities.