

Abstract Submitted
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Multi-dimensional simulation package for ultrashort pulse laser-matter interactions¹ ANASTASSIYA SUSLOVA, AHMED HASSANEIN, Purdue Univ — Advanced simulation models recently became a popular tool of investigation of ultrashort pulse lasers (USPLs) to enhance understanding of the physics and allow minimizing the experimental costs for optimization of laser and target parameters for various applications. Our research interest is focused on developing multi-dimensional simulation package FEMTO-2D to investigate the USPL-matter interactions and laser induced effects. The package is based on solution of two heat conduction equations for electron and lattice sub-systems - enhanced two temperature model (TTM). We have implemented theoretical approach based on the collision theory to define the thermal dependence of target material optical properties and thermodynamic parameters. Our approach allowed elimination of fitted parameters commonly used in TTM based simulations. FEMTO-2D is used to simulated the light absorption and interactions for several metallic targets as a function of wavelength and pulse duration for wide range of laser intensity. The package has capability to consider different angles of incidence and polarization. It has also been used to investigate the damage threshold of the gold coated optical components with the focus on the role of the film thickness and substrate heat sink effect.

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