

Wang, Haojie; Dai, Weizhong; Nassar, Raja; Melnik, Roderick

A finite difference method for studying thermal deformation in a thin film exposed to ultrashort-pulsed lasers. (English) [Zbl 1189.74034](#)

Int. J. Heat Mass Transfer 49, No. 15-16, 2712-2723 (2006).

Summary: Ultrashort-pulsed lasers have been attracting worldwide interest in science and engineering. Studying the thermal deformation induced by ultrashort-pulsed lasers is important for preventing thermal damage. This article presents a finite difference method for studying thermal deformation in a thin film exposed to ultrashort-pulsed lasers. The method is obtained based on the parabolic two-step model. It accounts for the coupling effect between lattice temperature and strain rate, as well as for the hot-electron-blast effect in momentum transfer. The method allows us to avoid non-physical oscillations in the solution as demonstrated by numerical examples.

MSC:

[74F05](#) Thermal effects in solid mechanics

[74K35](#) Thin films

[74S20](#) Finite difference methods applied to problems in solid mechanics

[80A20](#) Heat and mass transfer, heat flow (MSC2010)

Cited in **9** Documents

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