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A COMPUTER ANALYSIS OF INTERACTION OF UV LASER PULSES WITH THIN METALLIC LAYERS

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ABSTRACT

The results of computer analysis of interaction of UV ($\lambda=308,337$ nm) laser pulses with thin metallic layers (Ag,Cr,Cu) laid on a ceramic base were presented in this paper.

Two-dimensional model of heat transfer

$$\rho_i(T_i) c_p(T_i) \frac{\partial T_i}{\partial \tau} = \text{div}(k_i(T_i) \text{grad } T_i) \quad ; i=1,2$$

with Stefan's condition at the phase boundary

$$k(T) (\bar{n} \cdot \text{grad } T)|_l - k(T) (\bar{n} \cdot \text{grad } T)|_s = \rho L \bar{v} \cdot \bar{n}$$

where $\rho(T)$, $c_p(T)$, $k(T)$ denote the temperature-dependent density, heat capacity and thermal conductivity of 'i'-layer, L -heat of fusion, $\bar{v}$ - phase change surface velocity, $\bar{n}$ - unit vector perpendicular to the surface of phase change, l,s - liquid or solid state respectively has been taken into consideration. Both the time and space distribution of laser beam as well as heat losses by conduction and radiation have been considered, too.

The melt's shape as a function of laser parameters computed numerically, next had been compared with the experimental results. by using of an early elaborated lasers [1,2]

1. L. Iwanejko, M. Stefański, Z. Ujda, L. Pokora
Proc. SPIE vol.859, p. 249, 1987
2. J. Chłodziński, J. Kutyla, J. Makuchowski, L. Pokora
Proc. SPIE vol.859, p.54, 1987