Technological applications of laser shock physics

Inogamov N A[1,2,3,@], Zhakhovsky V V[1,3], Petrov Y V[2], Khokhlov V A[2,3], Perov E A[3], Kolobov Y R[4], Nelasov I V[4], Manokhin S S[4], Shepelev V V[5] and Fortova S V[5]

[1] Dukhov Research Institute of Automatics (VNIIA), Sushchevskaya 22, Moscow 127055, Russia
[2] Landau Institute for Theoretical Physics of the Russian Academy of Sciences, Akademika Semenova 1a, Chernogolovka, Moscow Region 142432, Russia
[3] Joint Institute for High Temperatures of the Russian Academy of Sciences, Izhorskaya 13 Bldg 2, Moscow 125412, Russia
[4] Institute of Problems of Chemical Physics of the Russian Academy of Sciences, Academician Semenov Avenue 1, Chernogolovka, Moscow Region 142432, Russia
[5] Institute for Computer-Aided Design of the Russian Academy of Sciences, Vtoraya Brestskaya 19/18, Moscow 123056, Russia

[@] nail@itp.ac.ru

Laser shock peening (LSP) and optoacoustics and therefore the physics of attenuation (nonlinear and 3D [1]) of laser shock waves (SW) are considered. The Hugoniot elastic limit separating elastic-plastic and elastic SWs is of utmost importance. This threshold is much higher in laser SW [2,3]. During the attenuation of a powerful SW, the elastoplastic and then the elastic stages are sequentially passed [4, 5]. The peening due to residual stresses at the elastic-plastic stage is investigated [4, 5]. An analysis of a complex 3D elastic wave consisting of bulk and surface components is given [4].

[1] Shepelev V, Petrov Y, Inogamov N, Zhakhovsky V, Perov E and Fortova S 2022 *Optics and Laser Technology* **152** 108100
[2] Ashitkov S I, Agranat M B, Kanel' G I, Komarov P S and Fortov V E 2010 *JETP Lett.* **92** 516–520
[3] Zhakhovskii V V and Inogamov N A 2010 *JETP Lett.* **92** 521–526
[4] Inogamov N A, Perov E A, Zhakhovsky V V, Shepelev V V, Petrov Y V and Fortova S V 2022 *JETP Letters* **115** 71–78
[5] Khokhlov V, Zhakhovsky V, Inogamov N, Ashitkov S, Sitnikov D S, Khishchenko K, Petrov Y, Manokhin S, Nelasov I, Shepelev V and Kolobov Y 2022 *JETP Letters* **115** 523–530