

# Numerical study of high-energy shock-wave processes in metals under the influence of ultrashort laser radiation using a multifluid model

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Currently, the use of ultrashort laser pulses for surface modification of materials is gaining great popularity. One example of this kind of process is surface hardening of metals [1, 2]. This work presents modeling of the effect of laser radiation on a volumetric aluminum target using a numerical algorithm based on the Baer–Nunziato multifluid model [3]. This model allows one to take into account the presence of several materials in an area and the contact boundary between them, while being quite simple and fast. In the current work characteristics of the hardening zone in aluminum were obtained, consistent with experimental data and the results of molecular dynamics simulation.

[1] Shepelev V V *et al* 2022 *Opt. Laser Technol.* **152** 108100

[2] Inogamov N A *et al* 2014 *Eng. Failure Anal.* **47** 328–337

[3] Baer M and Nunziato J 1986 *Int. J. Multiphase Flow* **12** 861–889