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Investigation of thermal and photoacoustic processes in layered structures under irradiation of modulated laser beams of high energy

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In present work the features of the interaction between modulated laser beams and layered structures are investigated. It was shown, that a modulation of beams allowed to obtain specific shape of temperature field by changing pulses repetition rate. Also photoacoustic effect was investigated.

In order to modulate the effect, corresponding thermoelastic deformation equation was solved. Lamination was taken into account by special procedure of averaging of combined equations. Solutions obtained for deformations and strains were in form of trigonometric series whose factors depended on medium's properties, energetic and frequency properties of laser beams. Then these trigonometric series were tabulated by PC at frequency range of pulses repetition rate of 1 Hz−1 GHz. This range is typical for known systems of modulation of laser and electron beams.

Obtained results allowed to reach radio frequency range of oscillations of strains σ and deformations ε with specific spatial and time configuration, determined by beam's modulation frequency. The existence of three steady configurations of σ and ε was shown. It weren't changed in wide range of frequency of pulses repetition rate. Oscillations of σ and ε were found, that propagate lossless.

In-plane and out-of-plane mechanical oscillations arising under irradiation of flaky mediums also have been well studied. The configuration of layered structures was discovered, at which the focusing of the energy of mechanical deformations took place.

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