

The Effect of Laser Shock Peening on the Thermophysical Parameters of Metals

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Abstract. Using Ti64 titanium alloy as an example, the article discusses the change in the thermophysical parameters of metals under the influence of a hardening method such as laser shock peening the essence of which is the formation of residual compressive stresses in the material under the influence of high-intensity laser radiation. The experiments are carried out with plates made of Ti64 titanium alloy, which is one of the most common construction materials in modern industry. One of the plates is a control specimen, and the surface of the second one is subjected to laser processing. The thermophysical parameters of specimens are determined using the infrared thermography method, the advantage of which is the ability to simultaneously measure two coefficients, thermal diffusivity and thermal conductivity of an explored material. The specimen is heated by the laser for some time, which can be perceived as a point heat source on the surface of the plate. Simultaneously with the laser action, the surface temperature of the specimen is recorded by an infrared camera. The thermophysical coefficients are determined as optimization parameters when matching experimental data with the analytical solution of the heat equation for a geometry similar to the experimental setup.

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