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COMPARATIVE ANALYSIS OF THERMAL PROCESSES IN BIOLOGICAL TISSUE AND POLYMETHYLMETHACRYLATE UNDER THE ACTION OF LASER RADIATION

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Abstract. *The paper presents the results of a study of temperature changes in biological tissues and polymethylmethacrylate when exposed to laser radiation. A comparative analysis of the thermophysical characteristics of materials has been carried out and the main parameters affecting the temperature distribution have been determined.*

Keywords: thermal effect, laser radiation, equation of thermal conductivity, Bouguer-Lambert-Beer law, coefficient of thermal conductivity, biological tissue

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0.05   /   ²,   CdTe,   -

» [1].

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0,3   0,5   /   ,   -

(1) [2].

1 –

	$k,$ / (.)
	~ 0,3
	0,5
	0,58
	0,62

,   -

,   .   , «

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» [3].

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60–100 °C   ,   .

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.   [4]   , «

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$$c_p \frac{\partial T}{\partial t} = \nabla \cdot (k \nabla T) + Q(x,t),\qquad (1)$$

–   , c_p –   , T –   , k –   -

, $Q(x,t)$ –   .

.   -

-              -

$$I(z) = I_0\, exp(-\mu z),\qquad (2)$$

$I(z)$ –   z, I_0 –   , μ –   .

$$Q(x,z) = aI(z)\delta(t - t_0),\qquad\qquad (3)$$

– , $\delta(t - t_0)$ - -

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x. t.

:

$$T_i^{n+1} = T_i^n + \frac{k\nabla t}{(pc_p)(\Delta x)^2}(T_{i+1}^n - 2T_i^n + T_{i+1}^n)\cdot\qquad\qquad (4)$$

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- .

, $T_{max} = 65$

$P = 1,5$.

$T_{max} = 82$.

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$$T(t) = T_0 + \rho c_p VPt,\qquad\qquad (5)$$

$T_0 –$, $V –$, $t –$.

,

$a =$

$1,1\cdot10^{-7}$ $^2/$, $– a = 1,4\cdot10^{-7}$ $^2/$. -

$t_{max} = 15$, $t_{max} = 12$. , -

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[5] . -

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[6] .

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