Физические основы фотоники. ДЗ1

Новоженов П.А. ЭН-26

Задание 37

$$grad(\vec{l},\vec{r}) = (\frac{\partial}{\partial x} + \frac{\partial}{\partial y} + \frac{\partial}{\partial z})(l_x x + l_y y + l z_z) = (l_x, l_u, l_z) = \vec{l}$$

$$(\vec{l},\nabla)\vec{r} = (l_x \frac{\partial}{\partial x} + l_y \frac{\partial}{\partial y} + l_z \frac{\partial}{\partial z})(x, y, z) = (l_x, l_u, l_z) = \vec{l}$$

Задание 41

$$grad\varphi(r) = \nabla\varphi(r) = \frac{\partial\varphi}{\partial r}\nabla r = \frac{\partial\varphi}{\partial r}\left(\frac{\partial x}{\partial x}\vec{i} + \frac{\partial y}{\partial y}\vec{j} + \frac{\partial z}{\partial z}\vec{k}\right) = \frac{\partial\varphi}{\partial r}(\vec{i}+\vec{j}+\vec{k}) = \frac{\partial\varphi}{\partial r}\frac{\vec{r}}{r}$$

Задание 43