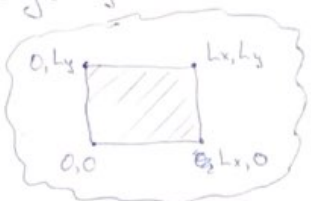
$$\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} - \frac{1}{v^2}\frac{\partial^2 u}{\partial t^2} = 0, \quad 0 \le t \le T,\ 0 \le x \le L_x,\ 0 \le y \le L_y$$



$$u(x,0,t) = u(0,y,t) = u(x,L_y,t) = u(0,L_x,y,t) = 0$$

$$u(x,y,0) = \exp\left(-\frac{(x-x_0)^2 + (y-y_0)^2}{r^2}\right)$$

$$\frac{\partial u}{\partial t} = 0 \quad \text{в нач. момент времени } t=0$$

x_0, y_0 – координаты бездействия

$$x_i = i h_x \quad i = \overline{0,I}, \quad h_x = \frac{L_x}{I}$$
$$y_j = j h_y \quad j = \overline{0,J}, \quad h_y = \frac{L_y}{J}$$
$$t_k = k h_t \quad k = \overline{0,K}, \quad h_t = \frac{T}{K}$$

$$\frac{\partial^2 u(x_i,y_j,t_k)}{\partial x^2} \approx \frac{u(x_{i+1},y_j,t_k) - 2u(x_i,y_j,t_k) + u(x_{i-1},y_j,t_k)}{h_x^2}$$

$$\frac{\partial^2 u(x_i,y_j,t_k)}{\partial y^2} \approx \frac{u(x_i,y_{j+1},t_k) - 2u(x_i,y_j,t_k) + u(x_i,y_{j-1},t_k)}{h_y^2}$$

$$\frac{\partial^2 u(x_i,y_j,t_k)}{\partial t^2} \approx \frac{u(x_i,y_j,t_{k+1}) - 2u(x_i,y_j,t_k) + u(x_i,y_j,t_{k-1})}{h_t^2}$$

$$\frac{\partial u(x_i,y_j,t_k)}{\partial t} \approx \frac{u(x_i,y_j,t_{k+1}) - u(x_i,y_j,t_k)}{h_t}$$

$$\frac{u^k_{i+1,j} - 2u^k_{i,j} + u^k_{i-1,j}}{h_x^2} + \frac{u^k_{i,j+1} - 2u^k_{i,j} + u^k_{i,j-1}}{h_y^2} - \frac{1}{v^2}\cdot\frac{u^{k+1}_{i,j} - 2u^k_{i,j} + u^{k-1}_{i,j}}{h_t^2} = 0, \quad \begin{matrix} i = \overline{1,I-1} \\ j = \overline{1,J-1} \\ k = \overline{1,K-1} \end{matrix}$$

$$u^k_{0,j} = u^k_{i,0} = u^k_{i,L_y} = u^k_{L_x,j} = 0, \quad i = \overline{0,I},\ j = \overline{0,J},\ k = \overline{0,K}$$

$$u^0_{i,j} = \exp\left(-\frac{(ih_x - x_0)^2 + (jh_y - y_0)^2}{r^2}\right), \quad i = \overline{0,I},\ j = \overline{0,J}$$

$$u^1_{i,j} = u^0_{i,j}, \quad i = \overline{0,I},\ j = \overline{0,J}$$

$$u^{k+1}_{i,j} = \frac{r^2 h_t^2}{h_x^2}\left(\quad\right) + \frac{r^2 h_t^2}{h_y^2}\left(\quad\right) + 2u^k_{i,j} - u^{k-1}_{i,j} =$$

$$= r^2 h_t^2\left(\frac{1}{h_x^2}\left(u^k_{i+1,j} + u^k_{i-1,j}\right) + \frac{1}{h_y^2}\left(u^k_{i,j+1} + u^k_{i,j-1}\right)\right) - u^{k-1}_{i,j} + 2\left(1 - \frac{1}{2}r^2 h_t^2\left(\frac{1}{h_x^2} + \frac{1}{h_y^2}\right)\right)u^k_{i,j}$$