

$$\begin{cases} \frac{dy_1}{dx} = -49y_1 + 125y_2 \\ \frac{dy_2}{dx} = 20y_1 - 49y_2 \end{cases} ; \quad \begin{cases} y_1(0) = A \\ y_2(0) = B \end{cases} ; \quad 0 < x \leq D = 1$$

$$-49y_1 + 125y_2 = \varphi(y_1, y_2)$$

$$20y_1 - 49y_2 = \psi(y_1, y_2)$$

Линейный метод
Эйлера

1-20 шагов

$$y_{i+1}^1 = y_i^1 + h\varphi(y_i^1, y_i^2)$$

$$y_{i+1}^2 = y_i^2 + h\psi(y_i^1, y_i^2)$$

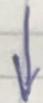
$$x_{i+1} = x_i + h$$

$$\begin{cases} \frac{y_{n+1} - y_n}{h} = f_{n+1} \\ y' = \lambda y \end{cases}$$

$$\begin{aligned} y_{n+1} &= y_n + h\lambda y_n = \\ &= y_n (1 + h\lambda) = R(h\lambda) \cdot y_n \\ R(h\lambda) &= R(z) = 1 + hy \end{aligned}$$

$$\det(A - \lambda E) = \begin{vmatrix} -49-\lambda & 125 \\ 20 & -49-\lambda \end{vmatrix} =$$

$$= (-49-\lambda)^2 - 2500 = 0$$



$$(-49-\lambda - 50)(-49-\lambda + 50) = 0$$

$$(\lambda + 99)(\lambda - 1) = 0$$

$$\hookrightarrow \begin{cases} \lambda = 1 \\ \lambda = -99 \end{cases}$$

$$\underline{\lambda = 1}: \begin{pmatrix} -50 & 125 \\ 20 & -50 \end{pmatrix} \sim \begin{pmatrix} 0 & 0 \\ 20 & -50 \end{pmatrix} \xrightarrow{\cancel{\text{Row 1}}} \begin{pmatrix} 2 & -5 \\ 0 & 0 \end{pmatrix}$$

$$\underline{h_1 = \begin{pmatrix} 2 \\ -5 \end{pmatrix}}$$

$$\underline{\lambda = -99}: \begin{pmatrix} 50 & 125 \\ 20 & 50 \end{pmatrix} \sim$$

$$\sim \begin{pmatrix} 0 & 0 \\ 20 & 50 \end{pmatrix} \sim \begin{pmatrix} 2 & 5 \\ 0 & 0 \end{pmatrix} \xrightarrow{\cancel{\text{Row 1}}} \underline{h_2 = \begin{pmatrix} 2 \\ 5 \end{pmatrix}}$$