

$$\begin{cases} \frac{dy_1}{dx} = -49y_1 + 125y_2 \\ \frac{dy_2}{dx} = 20y_1 - 49y_2 \end{cases}$$

$$\begin{cases} y_1(0) = A \\ y_2(0) = B \end{cases}$$

$$0 < x < D = 1$$

$$\begin{aligned} -49y_1 + 125y_2 &= \psi(y_1, y_2) \\ 20y_1 - 49y_2 &= \varphi(y_1, y_2) \end{aligned}$$

Явный метод
Эйлера

1-20 шаг

$$\begin{cases} y_{i+1}^1 = y_i^1 + h\psi(y_i^1, y_i^2) \\ y_{i+1}^2 = y_i^2 + h\varphi(y_i^1, y_i^2) \\ x_{i+1} = x_i + h \end{cases}$$

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

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

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

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

↓

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

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

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

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

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

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

$$\sim \begin{pmatrix} 0 & 0 \\ 20 & 50 \end{pmatrix} \sim \begin{pmatrix} 2 & 5 \\ 0 & 0 \end{pmatrix} \rightarrow \underline{h_2 = \begin{pmatrix} 2 \\ 5 \end{pmatrix}}$$