

## Маленное переменное

Метод Рунге-Кутты 4 порядка

$y_{10}, y_{20}$  - нач. условия.

$$\begin{cases} y_1' = f_1(x, y_1, y_2) \\ y_2' = f_2(x, y_1, y_2) \end{cases}$$

$$k_{11} = h \cdot f_1(x_0, y_{10}, y_{20})$$

$$k_{21} = h \cdot f_2(x_0, y_{10}, y_{20})$$

$$k_{12} = h \cdot f_1(x_0 + \frac{h}{2}, y_{10} + k_{11}/2, y_{20} + k_{21}/2)$$

$$k_{22} = h \cdot f_2(x_0 + \frac{h}{2}, y_{10} + k_{11}/2, y_{20} + k_{21}/2)$$

$$k_{13} = h \cdot f_1(x_0 + \frac{h}{2}, y_{10} + k_{12}/2, y_{20} + k_{22}/2)$$

$$k_{23} = h \cdot f_2(x_0 + \frac{h}{2}, y_{10} + k_{12}/2, y_{20} + k_{22}/2)$$

$$k_{14} = h \cdot f_1(x_0 + h, y_{10} + k_{13}, y_{20} + k_{23})$$

$$k_{24} = h \cdot f_2(x_0 + h, y_{10} + k_{13}, y_{20} + k_{23})$$

$$y_{10} + = (k_{11} + 2k_{12} + 2k_{13} + k_{14})/6$$

$$y_{20} + = (k_{21} + 2k_{22} + 2k_{23} + k_{24})/6 \quad x_0 + = h$$

W1  $x^2 y'' + x y' + (x^2 - 5)y = 0 \quad y(1) = 0 \quad y'(1) = 0$

$$z(x) = y'(x)$$

$$\begin{cases} y' = z = f_1(x, y, z) \end{cases}$$

$$\begin{cases} z' = -\frac{z}{x} - (1 - \frac{5}{x^2})y = f_2(x, y, z) \end{cases}$$

$$y(1) = 0$$

$$z(1) = 1$$

w2

$$\begin{cases} u' + v' + 3u + v = 0 & (1) \quad u(0) = 1 \end{cases}$$

$$\begin{cases} u' - v' + u + 3v = 0 & (2) \quad v(0) = 2 \end{cases}$$

$$(1) + (2): 2u' + 4u + 4v = 0$$

$$u' = -2u - 2v$$

$$(1) - (2): 2v' + 2u - 2v = 0$$

$$v' = -u + v$$

$$f_1(t, u, v) = -2u - 2v$$

$$f_2(t, u, v) = -u + v$$

$$\begin{cases} u' = f_1(t, u, v) \end{cases}$$

$$\begin{cases} v' = f_2(t, u, v) \end{cases}$$