

Pr. $y^{(4)} - y''' + y'' - y' = 0; y(0)=1, y'(0)=1; y''(0)=0; y'''(0)=0$

char. rovnice:

$$\lambda^4 - \lambda^3 + \lambda^2 - \lambda = 0$$

$$\lambda(\lambda^3 - \lambda^2 + \lambda - 1) = 0$$

$$\lambda(\lambda^2(\lambda-1) + (\lambda-1)) = 0$$

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

$$\lambda_1 = 0 \sim w_1 = 1$$

$$\lambda_2 = 1 \sim w_2 = e^x$$

$$\lambda_{3,4} = \pm i \sim w_3 = \cos x$$

$$w_4 = \sin x$$

$$y = c_1 + c_2 e^x + c_3 \cos x + c_4 \sin x \rightarrow \textcircled{1} y(0)=1 \Rightarrow c_1 + c_2 + c_3$$

$$y' = c_2 e^x - c_3 \sin x + c_4 \cos x \rightarrow \textcircled{2} y'(0)=1 = c_2 + c_4$$

$$y'' = c_2 e^x - c_3 \cos x - c_4 \sin x \rightarrow \textcircled{3} y''(0)=0 = c_2 - c_3$$

$$y''' = c_2 e^x + c_3 \sin x - c_4 \cos x \rightarrow \textcircled{4} y'''(0)=0 = c_2 - c_4$$

$$\textcircled{1} 1 = c_2 + c_4$$

$$\textcircled{2} 0 = c_2 - c_4$$

$$1 = 2c_2 \rightarrow c_2 = \frac{1}{2} \rightarrow c_4 = \frac{1}{2}$$

$$\textcircled{3} \rightarrow c_3 = \frac{1}{2}$$

$$c_1 = 0$$

$$\underline{y = \frac{1}{2}(e^x + \cos x + \sin x)}$$

NEHOMOGENNÍ RCE - LODR_m

variance konstant

Pr. $y'' + y = \frac{1}{\sin x} f(x)$

① předchůzí homogenní rce:

$$y_h'' + y_h = 0$$

$$\text{char. } \lambda^2 + 1 = 0$$

$$\lambda_{1,2} = \pm i \begin{cases} w_1 = \cos x \\ w_2 = \sin x \end{cases}$$

$$y_h = c_1 \cos x + c_2 \sin x$$

② metoda variance konstant

$$y(x) = c_1(x) \cos x + c_2(x) \sin x$$

$$W(x) \cdot C'(x) = F(x)$$

$$\begin{pmatrix} w_1 & w_2 \\ w_1' & w_2' \end{pmatrix} \cdot \begin{pmatrix} c_1'(x) \\ c_2'(x) \end{pmatrix} = \begin{pmatrix} 0 \\ f(x) \end{pmatrix}$$