

stiff differential equations

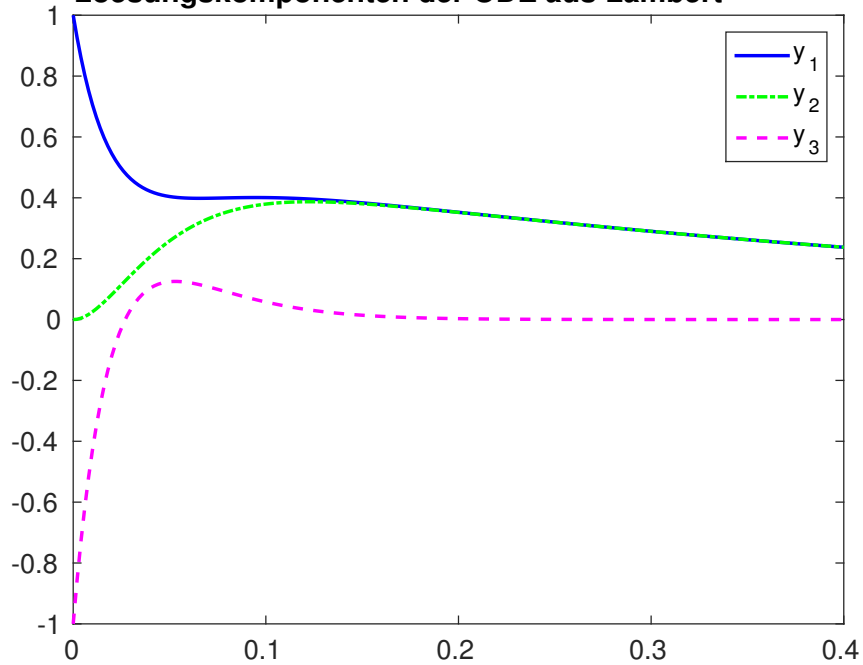
$$y' = Ay, \quad y(0) = \begin{pmatrix} 1 \\ 0 \\ -1 \end{pmatrix}, \quad A = \begin{pmatrix} -21 & 19 & -20 \\ 19 & -21 & 20 \\ 40 & -40 & -40 \end{pmatrix}.$$

eigenvalues of A : $\lambda_1 = -2$, $\lambda_2 = -40(1 + \mathbf{i})$, $\lambda_3 = -40(1 - \mathbf{i})$.

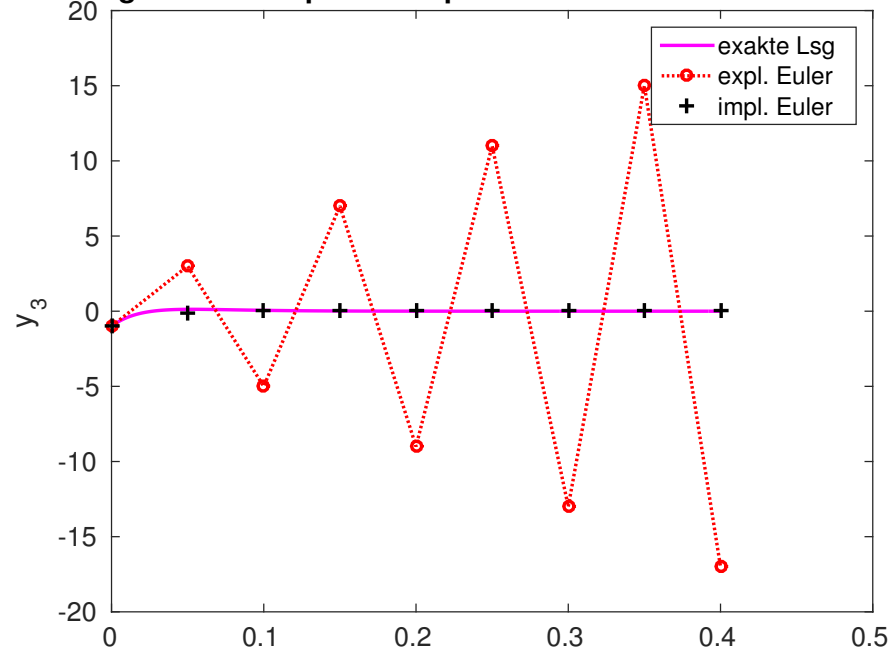
sought solution is

$$\begin{aligned} y_1(t) &= \frac{1}{2}e^{-2t} + \frac{1}{2}e^{-40t} (\cos 40t + \sin 40t), \\ y_2(t) &= \frac{1}{2}e^{-2t} - \frac{1}{2}e^{-40t} (\cos 40t + \sin 40t), \\ y_3(t) &= -e^{-40t} (\cos 40t - \sin 40t). \end{aligned}$$

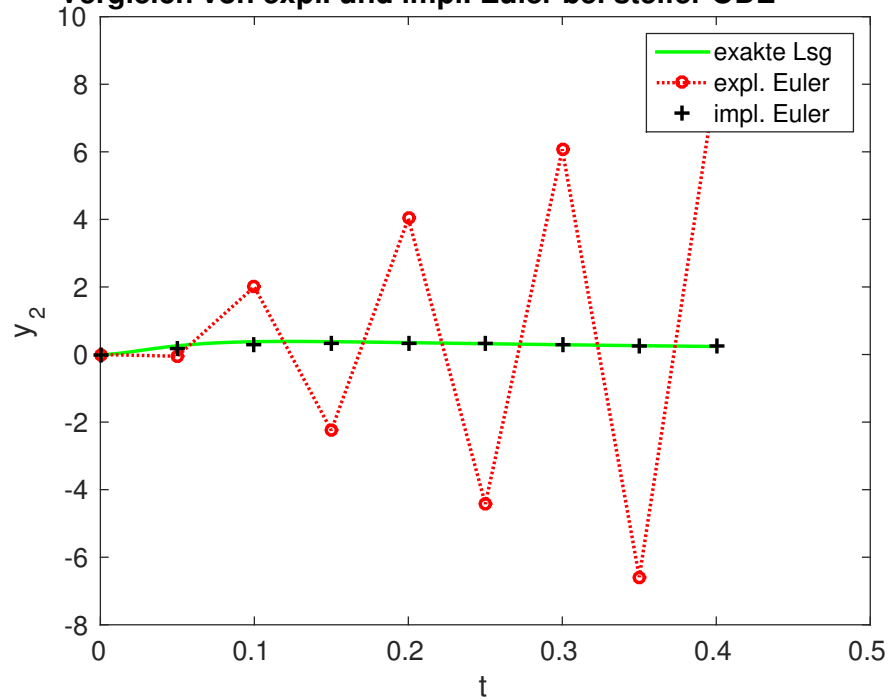
Loesungskomponenten der ODE aus Lambert



Vergleich von expl. und impl. Euler bei steifer ODE



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