

57.1.7

$$y' + 5y^5 + 2\sin \pi y = 0$$

$$y(0) = 1 \quad 0 \leq x \leq 1$$

$$y' = f(x, y) = -5y^5 + 2\sin \pi y$$

$$p = 2$$

$$y_{n+1} = y_n + h \left( \frac{1}{2} k_1 + \frac{1}{2} k_2 \right)$$

$$k_1 = f(y_n + h \cdot \frac{1}{9})$$

$$k_2 =$$

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$$R(z) = \frac{\det(E - zA + ze\beta^T)}{\det(E - zA)}$$

$$\det(I - zA) = (1 - \frac{z}{9})(1 - \frac{z}{9}) = (1 - \frac{z}{9})^2$$

$$\det(E - zA + ze\beta^T) = \det \begin{pmatrix} 1 - \frac{z}{9} & 0 \\ \frac{7}{9} & 1 - \frac{z}{9} \end{pmatrix} + \begin{pmatrix} \frac{7}{2} & \frac{z}{2} \\ \frac{z}{2} & \frac{z}{2} \end{pmatrix} =$$

$$= -\frac{8z^2}{81} + \frac{7z}{18} + 1$$

$$R(z) = -\frac{16z^2 - 63z - 162}{2(z-9)^2}$$

$$|R(z)| \leq 1$$

$$z \in \left[ \frac{27}{28} - \frac{9\sqrt{233}}{28}; 0 \right] \cup \left[ \frac{11}{2}; \frac{27}{28} + \frac{9\sqrt{233}}{28} \right]$$

$$|R(z)| = |R(\omega h)| \quad \downarrow = \frac{\partial f(x, y)}{\partial y} = -25y^4 - 2\pi \cdot \cos \pi y \Big|_{y=1} =$$

$$= -25 + 2\pi$$

$$\left| -\frac{16((-25+2\pi)h)^2 - 63(-25+2\pi)h - 162}{2((-25+2\pi)h - 9)^2} \right| \leq 1$$

A: →

$$\frac{1}{9} \begin{pmatrix} 1/9 & 0 \\ 8/9 & 1/9 \\ \hline 1/2 & 1/2 \end{pmatrix}$$

$\frac{1}{2}$

$\frac{1}{2}$

$$\begin{pmatrix} \frac{1}{2} \\ \frac{1}{2} \\ \frac{1}{2} \\ \frac{1}{2} \end{pmatrix} \quad \begin{pmatrix} \frac{1}{2} \\ \frac{1}{2} \\ \frac{1}{2} \\ \frac{1}{2} \end{pmatrix}$$