Ex 1

$$EI\, w''''(x) = q(x, w(x))$$

$$\begin{cases} w'(x) = a(x) \\ EI\, a'''(x) = q(x, w(x)) \end{cases}$$

$$\begin{cases} w' = a \\ a' = b \\ EI\, b'' = q \end{cases}$$

$$\begin{cases} w' = a \\ a' = b \\ b' = c \\ EI\, c' = q \end{cases}$$

$$\begin{cases} w'(x) = a(x) \\ a'(x) = b(x) \\ b'(x) = c(x) \\ c'(x) = \frac{1}{EI} q(x, w(x)) \end{cases} \Rightarrow \vec{Y}(x) = \begin{pmatrix} w \\ a \\ b \\ c \end{pmatrix} \quad \vec{F}(x, \vec{Y}(x)) = \begin{pmatrix} a \\ b \\ c \\ \frac{1}{EI} q \end{pmatrix}$$

$$\vec{Y}'(x) = \vec{F}(x, \vec{Y}(x))$$

EULER

$$Y_{i+1} = Y_i + \Delta x\, \vec{F}(x_i, Y_i)$$

$$x_{i+1} = x_i + \Delta x$$

$$\begin{cases} w_{i+1} = w_i + \Delta x\, a_i \\ a_{i+1} = a_i + \Delta x\, b_i \\ b_{i+1} = b_i + \Delta x\, c_i \\ c_{i+1} = c_i + \frac{\Delta x}{EI} q(x_i, w_i) \\ x_{i+1} = x_i + \Delta x \end{cases}$$

POINT AU MILIEU

$$Y_{i+1} = Y_i + \Delta x\, \vec{F}(x_m, Y_m)$$

avec $x_m = x_i + \frac{\Delta x}{2}$

$$Y_m = Y_i + \frac{\Delta x}{2} \vec{F}(x_i, Y_i)$$

$$\begin{cases} w_{i+1} = w_i + \Delta x\, a_m \\ a_{i+1} = a_i + \Delta x\, b_m \\ b_{i+1} = b_i + \Delta x\, c_m \\ c_{i+1} = c_i + \frac{\Delta x}{EI} q(x_m, w_m) \\ x_{i+1} = x_i + \Delta x \end{cases}$$

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