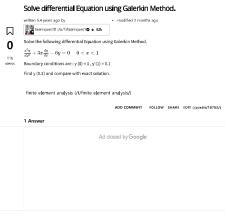


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written 5.4 years ago by

teamques10 (/u/1/teamques1♥ ★ 32k

Galerkin Method:

O Degree of polynomial = 3 Let approximate solution be y

 $y = C_0 + C_1 x + C_2 x^2 + C_3 x^3$ $y' = C_1 x + 2C_2 x + 3C_3 x^2$

From boundary condition 1: y(0) = 1 $C_0 = 1$

From boundary condition 2 : y'(1) = 0.1

 $\begin{aligned} 0.1 &= C_1 + 2C_2 + 3C_3 \\ ' \therefore C_1 &= 0.1 - 2C_2 - 3C_3 \end{aligned}$

 $y = 1 + (0.1 - 2C_2 - 3C_3x) + C_2x^2 + C_3x^3$ $\therefore y = 1 + 0.1x + C_2(x^2 - 2x) + C_3(x^3 - 3x)$ $\frac{dy}{dx} = 0.1 + C_2(2x - 2) + C_3(3x^2 - 3)$

 $\frac{d^2y}{dx^2} = 2C_2 + 6xC_3$

Residue,

$$\begin{split} R &= \frac{e^{2}}{e^{2}} + 3x\frac{dy}{dx} - 6y \\ &= 2C_{2} + 6xC_{3} + 3x[0.1 + C_{2}(2x + 2) + C_{3}(3x^{2} - 3)] \\ &- 6[1 + 0.1x + C_{3}(x^{2} - 2x) + C_{3}(x^{2} - 3x)] \\ &= C_{1}[2 + 3x(2x - 2) + 12x - 6x^{2}] + C_{3}[6x + 3x(sx^{2} - 3) + 18x - 6x^{2}] + 0.3x - 6 - 0. \end{split}$$

-.6x $C_2(6x+2) + C_3(3x^2 + 15x) - 0.3x - 6$ Weighted Integral form

 $\int\limits_{-}^{1}WiRdx=0 \qquad -----(1)$

For Galerkin method,

wi = coefficients of C_i in v

 $W_1=(x^2-2x)$ and $w_2=(x^3-3x)$

 $\int\limits_{-}^{1}(x^{2}-2x)[C_{2}(6x+2)+C_{3}(3x^{3}+15x)-0.3x-6]dx=0$

Equation 1: i = 2

 $\int_{0}^{1} (x^{3} - 3x)[C_{2}(6x + 2) + C_{3}(3x^{3} + 15x) - 0.3x - 6]dx = 0$ $\begin{aligned} & -7.3C_2 - 13.371C_3 + 7.74 = 0 \\ & 7.3C_2 + 13.371C_3 = 7.74 & ---- - (3) \end{aligned}$

Solving equations (2) and (3), $C_2 = 2.64 \ \mathrm{and} \ C_3 = -0.862$ $\begin{array}{l} \dots & \text{$\sim s$} = -0.002\\ \dots & y = 1 + 0.1x + 2.64(x^2 - 2x) - 0.862(x^3 - 3x)\\ y(0.2) = 0.58 \end{array}$

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