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Assignment 2

2) $EI\frac{d^2y}{dx^2} = \frac{w}{2}(L-x)^2$

$EIm^2 = 0$

$m^2 = 0$

$m = \pm\sqrt{0}$

$m = \pm 0$

$y = e^{-x}[A+Bx]$

$y = A+Bx$

$y_p = y = Fx^2 + Gx^3 + Hx^4$

$\frac{dy}{dx} = 2Fx + 3Gx^2 + 4Hx^3$ $\qquad \frac{d^2y}{dx^2} = 2F + 6Gx + 12Hx^2$

$EI[2F + 6Gx + 12Hx^2] = \frac{w}{2}[L-x]^2$

$2FEI + 6GEIx + 12HEIx^2 = \frac{w}{2}[L-x]^2$

$4FEI + xEIx + 24HEIx^2 = w(L^2 - 2Lx + x^2)$

$24HEI = w$

$H = \frac{w}{24EI}$

$12GEI = -2wL$

$G = \frac{-2wL}{12GEI} = \frac{-wL}{6EI}$

$4FEI = wL^2$

$F = \frac{wL^2}{4EI}$

$y = \left[\frac{wL^2}{4EI}\right]x^2 - \left[\frac{wL}{6EI}\right]x^3 + \left[\frac{w}{24EI}\right]x^4.$

1) $\frac{d^2y}{dx^2} + \frac{4dy}{dx} + 5y = 6\sin\theta$

Solution

$m^2 + 4m + 5 = 0$

$m = -b \pm \sqrt{(b^2 - 4ac)} / 2a$

$m = -4 \pm \sqrt{[4^2 - 4 \times 1 \times 5]} / 2 \times 1$

$m = -4 \pm \sqrt{4} \cdot \sqrt{-1} / 2$

$m = \frac{-4}{2} \pm \frac{2j}{2}$

$m = -2 \pm j$

Assumed PI

$y = A\cos\theta + B\sin\theta$

$\frac{dy}{d\theta} = -A\sin\theta + B\cos\theta$

$\frac{d^2y}{d\theta^2} = -A\cos\theta - B\sin\theta$

$[-A\cos\theta - B\sin\theta] + 4[-A\sin\theta + B\cos\theta] + 5[A\cos\theta + B\sin\theta] = 6\sin\theta$

$= -A\cos\theta - B\sin\theta - 4A\sin\theta + 4B\cos\theta + 5A\cos\theta + 5B\sin\theta = 6\sin\theta$

$4A + 4B = 0$

$-4A + 4B = 6$

$A = \frac{-4B}{4}$

$A = -B$

sub equ $A = -B$ in equ 2 therefore

$-4(-B) + 4B = 6$

$4B + 4B = 6$

$B = 6/8 \qquad B = 3/4$

$A < -3/4$

$$P.I \quad y = -\frac{3}{4}\cos\theta + \frac{3}{4}\sin\theta$$

$$G.S \quad y = e^{-2\theta}(A\cos\theta + B\sin\theta) - \frac{3}{4}\cos\theta + \frac{3}{4}\sin\theta$$

$$P.I = 0$$

$$y = \frac{-3}{4}\cos\theta + \frac{3}{4}\sin\theta$$

$$0 = -\frac{3}{4}\cos\theta + \frac{3}{4}\sin\theta$$

$$-\frac{3}{4}\sin\theta = \frac{-3}{4}\cos\theta$$

$$-\cos\theta = \sin\theta$$

Divide both sides by $-\cos\theta$

$$\frac{\cancel{-\cos\theta}}{\cancel{-\cos\theta}} = \frac{-\sin\theta}{-\cos\theta}$$

$$1 = \tan\theta$$

$$\tan^{-1}(1) = \theta$$

$$\theta = 45^\circ$$