Participación Extra
Díaz Hernández Marcos Bryan
Ecuaciones Diferenciales
Grupo: 25

5) $y'' - 3y' = 8e^{3x} + 4\operatorname{sen}(x)$ $\quad Z(D) = (D-3)(D^2+1)$

$n=1 \quad n=1$

$\alpha=3 \quad \alpha=0$

$\beta=1$

$(D-3)(D^2+1)(D^2-3D)y = (D-3)(D^2+1)(8e^{3x} + 4\operatorname{sen}(x)) \to 0$

$(r-3)(r^2+1)(r^2-3r) = 0$

$y_h = r^2 - 3r = 0 \quad r(r-3) = 0 \quad r_1 = 0$

$r_2 = 3$

$y_h = C_1 e^{0x} + C_2 e^{3x}$

$y_{pnh} = (r-3)(r^2+1) = 0 \quad r_3 = 3$

$\left.\begin{matrix} r_4 = -i \\ r_5 = +i \end{matrix}\right\} \begin{matrix} \alpha = 0 \\ \beta = 1 \end{matrix}$

$y_{pnh} = C_3 x e^{3x} + C_4 \cos(x) + C_5 \operatorname{sen}(x)$

Participación Extra
Díaz Hernández Marcos Bryan
Ecuaciones Diferenciales
Grupo: 25

$y_{pnh} = C_3 x e^{3x} + C_4\cos(x) + C_5\operatorname{sen}(x)$

$y'_{pnh} = C_3[(x)(3e^{3x}) + (e^{3x})] - C_4\operatorname{sen}(x) + C_5\cos(x)$

$y''_{pnh} = 3C_3[(x)(3e^{3x}) + (e^{3x})] + 3C_3 e^{3x} - C_4\cos(x) - C_5\operatorname{sen}(x)$

$\cancel{9C_3 x e^{3x}} + 3\cancel{C_3 e^{3x}} + 3C_3 e^{3x} - C_4\cos(x) - C_5\operatorname{sen}(x)$
$- 3(\cancel{3C_3 x e^{3x}} + \cancel{C_3 e^{3x}} - C_4\operatorname{sen}(x) + C_5\cos(x))$

$3C_3 e^{3x} - C_4\cos(x) - C_5\operatorname{sen}(x) + 3C_4\operatorname{sen}(x) + 3C_5\cos(x) = 8e^{3x} + 4\operatorname{sen}(x)$

$3C_3\cancel{e^{3x}} = 8\cancel{e^{3x}} \quad C_3 = 8/3$

$-C_4\cos(x) - 3C_5\cos(x) - C_5\operatorname{sen}(x) + 3C_4\operatorname{sen}(x) = 4\operatorname{sen}(x) + 0\cos(x)$

$\cos(x)(-C_4 - 3C_5) = 0\cos(x) \quad -C_4 - 3C_5 = 0$

$\operatorname{sen}(x)(-C_5 + 3C_4) = 4\operatorname{sen}(x) \quad -C_5 + 3C_4 = 4$

$C_4 = -3C_5 \rightarrow -C_5 + 3(-3C_5) = 4 \rightarrow -C_5 - 9C_5 = 4 \quad C_5 = \frac{4}{-10}$

$-C_5 = \frac{2}{-5} \quad C_4 = -3(-\frac{2}{5}) \quad C_4 = +6/5$

$C_3 = 8/3 \quad C_4 = 6/5 \quad C_5 = -2/5$

$y_p = \frac{8}{3} x e^{3x} + \frac{6}{5}\cos(x) + -\frac{2}{5}\operatorname{sen}(x)$

$y_g = C_1 + C_2 e^{3x} + \frac{8}{3} x e^{3x} + \frac{6}{5}\cos(x) - \frac{2}{5}\operatorname{sen}(x)$

Participación Extra
Díaz Hernández Marcos Bryan
Ecuaciones Diferenciales
Grupo: 25

6) $y'' + y = x\cos x - \cos x \qquad \mathcal{L}(D) = (D^2+1)^2$

$n=2 \quad n=1$

$\left.\begin{array}{ll} \alpha=0 & \alpha=0 \\ \beta=1 & \beta=1 \end{array}\right\}$ iguales $\quad \cos(x)(x-1)$

$(D^2+1)^2(D^2+1)y = (D^2+1)^2 (x\cos x - \cos x) \rightarrow 0$

$(r^2+1)^2(r^2+1) = 0$

$yh = \begin{array}{l} r_1 = +i \\ r_2 = -i \end{array} \left.\begin{array}{l} \alpha=0 \\ \beta=1 \end{array}\right\} yh = e^{0x}(c_1\cos(x) + c_2\operatorname{sen}(x))$

$yp = (r^2+1)^2 = 0 \quad (r^2+1)(r^2+1) = 0 \quad \begin{array}{l} r_3 = +i \\ r_4 = -i \\ r_5 = +i \\ r_6 = -i \end{array} \quad \begin{array}{l} \alpha=0 \\ \beta=1 \end{array}$

$ypnh = c_3 x\cos(x) + c_4 x\operatorname{sen}(x) + c_5 x^2\cos(x) + c_6 x^2\operatorname{sen}(x)$

$y'pnh = c_3[-\operatorname{sen}(x)(x) + \cos(x)] + c_4[(x)\cos(x) + \operatorname{sen}(x)]$

$c_5[(x^2)(-\operatorname{sen}(x)) + \cos(x)(2x)] + c_6[(x^2)(\cos(x)) + \operatorname{sen}(x)(2x)]$

$y''pnh = -c_3[(x)(\cos(x)) + \operatorname{sen}(x)] - c_3\operatorname{sen}(x) + c_4[(x)(-\operatorname{sen}(x)) + \cos(x)]$
$+ c_4\cos(x) - c_5[(x^2)(\cos(x)) + \operatorname{sen}(x)(2x)] +$
$2c_5[(x)(-\operatorname{sen}(x)) + \cos(x)] + c_6[(x^2)(-\operatorname{sen}(x)) + \cos(x)(2x)] +$
$2c_6[(x)(\cos(x)) + \operatorname{sen}(x)]$

$= -c_3 x\cos(x) - c_3\operatorname{sen}(x) - c_3\operatorname{sen}(x) - c_4 x\operatorname{sen}(x) + c_4\cos(x) + c_4\cos(x)$
$- c_5 x^2\cos(x) - c_5 2x\operatorname{sen}(x) - 2c_5 x\operatorname{sen}(x) + 2c_5\cos(x)$
$- c_6 x^2\operatorname{sen}(x) + 2c_6 x\cos(x) + 2c_6 x\cos(x) + 2c_6\operatorname{sen}(x)$ /
$c_3 \cancel{x}\cos(x) + c_4 x \cancel{\operatorname{sen}}(x) + c_5 x^2 \cancel{\cos}(x) + \cancel{c_6 x^2}\operatorname{sen}(x)$

$-c_3 \cancel{x}\cos(x) - 2c_3\operatorname{sen}(x) - c_4 \cancel{x\operatorname{sen}}(x) + 2c_4\cos(x) - c_5 \cancel{x^2}\cos(x)$
$-4c_5 x\operatorname{sen}(x) + 2c_5\cos(x) - \cancel{c_6 x^2}\operatorname{sen}(x) + 4c_6 x\cos(x) + 2c_6\operatorname{sen}(x)$

$-2c_3\operatorname{sen}(x) - 4c_5 x\operatorname{sen}(x) + 2c_6\operatorname{sen}(x) = 0\operatorname{sen}(x)$

$2c_4\cos(x) + 2c_5\cos(x) + 4c_6 x\cos(x) = \cos(x)(x-1)$

Participación Extra
Díaz Hernández Marcos Bryan
Ecuaciones Diferenciales
Grupo: 25

1) $2C_4 + 2C_5 + 4C_6x = x - 7$

$4C_6x = x$

$C_6 = 1/4$

$2C_4 + 2C_5 = -7$

$2C_4 = -1$

$C_4 = -1/2$

2) $-2C_3 - 4C_5x + 2C_6 = 0$

$-2C_3 - 4C_5x = -1/2$

$-4C_5x = 0x$

$C_5 = 0$

$-2C_3 = -1/2$

$C_3 = 1/4$

$C_3 = 1/4 \quad C_4 = -1/2 \quad C_5 = 0 \quad C_6 = 1/4$

$y_{pnh} = \frac{1}{4}x\cos(x) - 1/2\,x\,\mathrm{sen}(x) + 0x^2\cos(x) + \frac{1}{4}x^2\,\mathrm{sen}(x)$

$y_g = C_1\cos(x) + C_2\,\mathrm{sen}(x) + \frac{1}{4}x\cos(x) - \frac{1}{2}x\,\mathrm{sen}(x) + \frac{1}{4}x^2\,\mathrm{sen}(x)$ //

7) $y'' - 2y' + y = 10e^{-2x}\cos(x) \quad A(D) = (D^2 + 4D + 4 + 1)$

$= (D^2 + 4D + 5)$

$n = 1$

$\alpha = -2$

$\beta = 1$

$(D^2 + 4D + 5)(D^2 - 2D + 1)y = (D^2 + 4D + 5)(10e^{-2x}\cos(x)) \to 0$

$(r^2 + 4r + 5)(r^2 - 2r + 1) = 0$

$y_h: r^2 - 2r + 1 = (r - 1)(r - 1) = r_1 = 1$

$r_2 = 1$

$y_h = C_1e^x + C_2xe^x$

$y_{pnh} = r^2 + 4r + 5 = \frac{-4 \pm \sqrt{16 - 20}}{2} = \frac{-4 \pm 2i}{2} = -2 \pm i$

$\left.\begin{array}{l} r_3 = -2 + i \\ r_4 = -2 - i \end{array}\right\} \begin{array}{l} \alpha = -2 \\ \beta = 1 \end{array}$

$y_{pnh} = e^{-2x}(C_3\cos(x) + C_4\,\mathrm{sen}(x))$

$y'_{pnh} = (e^{-2x})(-C_3\,\mathrm{sen}(x) + C_4\cos(x)) + (C_3\cos(x) + C_4\,\mathrm{sen}(x))(-2e^{-2x})$

$y''_{pnh} = (e^{-2x})(-C_3\cos(x) - C_4\,\mathrm{sen}(x)) + (-C_3\,\mathrm{sen}(x) + C_4\cos(x))(-2e^{-2x})$
$+ (C_3\cos(x) + C_4\,\mathrm{sen}(x))(4e^{-2x}) + (-2e^{-2x})(-C_3\,\mathrm{sen}(x) + C_4\cos(x))$

Participación Extra
Díaz Hernández Marcos Bryan
Ecuaciones Diferenciales
Grupo: 25

$$-(e^{-2x})(c_3\cos(x)) - (e^{-(2x)})(c_4\, sen(x)) + 2e^{-2x}(c_3 sen(x)) - 2e^{-2x}(c_4\cos(x))$$

$$+ 4e^{-2x}(c_3\cos(x)) + 4e^{-2x}(c_4 sen(x)) + 2e^{-2x}(c_3 sen(x)) - 2e^{-2x}\cos(x))(c_4$$

$$= 3e^{-2x}(c_3\cos(x)) + 4e^{-2x}(c_3 sen(x)) + 3e^{-2x}(c_4 sen(x)) - 4e^{-2x}(c_4\cos(x))$$

$$-2(-e^{-2x}(c_3 sen(x)) + e^{-2x}(c_4\cos(x)) - 2e^{-2x}(c_3\cos(x)) - 2e^{-2x}(c_4 sen(x)))$$

$$= 3e^{-2x}\underline{(c_3\cos(x))} + 4e^{-2x}\underline{(c_3 sen(x))} + 3e^{-2x}\underline{(c_4 sen(x))} - 4e^{-2x}\underline{(c_4\cos(x))}$$

$$+ 2e^{-2x}\underline{(c_3 sen(x))} - 2e^{-2x}\underline{(c_4\cos(x))} + 4e^{-2x}\underline{(c_3\cos(x))} + 4e^{-2x}\underline{(c_4 sen(x))}$$

$$= 7e^{-2x}(c_3\cos(x)) + 7e^{-2x}(c_4 sen(x)) - 6e^{-2x}(c_4\cos(x)) + 6e^{-2x}(c_3 sen(x))$$

$$+ e^{-2x}(c_3\cos(x)) + e^{-2x}(c_4 sen(x))$$

$$8e^{-2x}(c_3\cos(x)) + 8e^{-2x}(c_4 sen(x)) - 6e^{-2x}(c_4\cos(x)) + 6e^{-2x}(c_3 sen(x))$$

$$8\cancel{e^{-2x}}(c_3\cancel{\cos(x)}) - 6\cancel{e^{-2x}}(c_4\cancel{\cos(x)}) = 10\cancel{e^{-2x}}\cancel{\cos(x)}$$

$$8c_3 - 6c_4 = 10$$

$$8e^{-2x}(c_4 sen(x)) + 6e^{-2x}(c_3 sen(x)) = 0e^{0x} sen(x)$$

$$8c_4 + 6c_3 = 0 \qquad 8c_3 = 10 + 6c_4 \qquad c_3 = \frac{5+3c_4}{4}$$

$$8c_3 - 6c_4 = 10 \qquad 8c_4 + 6\left(\frac{5+3(c_4)}{4}\right) = 0$$

$$6c_3 = -8c_4 \qquad 8c_4 + \frac{30+18c_4}{4} \rightarrow 8c_4 + \frac{15}{2} + \frac{9c_4}{2} = 0$$

$$6c_3 = -8\left(-\frac{3}{5}\right) \qquad \frac{25c_4}{2} = -\frac{15}{2}$$

$$c_3 = \frac{24}{(6)(5)} = \frac{4}{5} \qquad c_4 = -\frac{15}{25} = -\frac{3}{5}$$

$$y_{p\,nh} = e^{-2x}\left(\frac{4}{5}\cos(x) - \frac{3}{5} sen(x)\right)$$

$$\underline{y_g = c_1e^{x} + c_2xe^{x} + e^{-2x}\left(\frac{4}{5}\cos(x) - \frac{3}{5} sen(x)\right)}$$