

Fracciones Parciales

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$$X(s) = \frac{2s^3 + 8s^2 + 4s + 6}{s(s+1)(s^2 + 4s + 6)}$$

$$= \frac{K_1}{s} + \frac{K_2}{s+1} + \frac{A}{s+2+j2} + \frac{A^*}{s+2-j2}$$

$$K_1 = sX(s) \Big|_{s=0} = \frac{2s^3 + 8s^2 + 4s + 6}{(s+1)(s^2 + 4s + 6)} \Big|_{s=0} = \frac{6}{1 \cdot 6} \Rightarrow K_1 = 1$$

$$K_2 = (s+1)X(s) \Big|_{s=-1} = \frac{(s+1)(2s^3 + 8s^2 + 4s + 6)}{s(s+1)(s^2 + 4s + 6)} \Big|_{s=-1}$$

$$= \frac{2(-1)^3 + 4(-1)^2 + 4(-1) + 6}{(-1)(-1)^2 + 4(-1) + 6} = \frac{2(-1) + 4(1) - 4 + 6}{(-1)(1 - 4 + 6)}$$

$$= \frac{-2 + 4 - 4 + 6}{1(-5)} = \frac{4}{-5} \Rightarrow K_2 = -\frac{4}{5}$$

$$A = (s+2+j2)X(s) \Big|_{s=-2-j2} = \frac{(s+2+j2)(2s^3 + 8s^2 + 4s + 6)}{s(s+1)(s^2 + 4s + 6)} \Big|_{s=-2-j2}$$

$$= \frac{(s+2+j2)(2s^3 + 8s^2 + 4s + 6)}{s(s+1)(s+2-j2)} \Big|_{s=-2-j2}$$

Por partes

$$2s^3 = 2[-2-j2]^3$$

$$= 2[(-2)^3 + 3(-2)^2(-j2) + 3(-2)(-j2)^2 + (-j2)^3]$$

$$(-j2)^3 = (-1)^3 j^3 2^3$$

$$= -1 j^3 16 = -8(-1) = 8$$

$$2s^2 = 2[-6 - j24 + 24 + j6]$$

$$2s^2 = 32 - j32$$

Denominador:

$$32 - j32 + j64 + 4(-2-j2) + 8 - 8 - j8 = 32 - j32 + j64 - j8$$

$$\text{Numerador} \rightarrow 32s + 24$$

denominator

$$s(s+1)(s+2-j1) = (-2-j1)(-1-j2+1)(-2-j1+2+j2) \\ = 24 + j8$$

$$A = \frac{32s + 24}{24 + j8} = \frac{s(4+j3)}{s(3+j)} \rightarrow A = \frac{4+j3}{3+j} \cdot \frac{3-j}{3-j} = \frac{15-j5}{10}$$

$$A = 1,5 - j0,5$$

$$\infty \left[\frac{1}{s} + \frac{-2}{s+1} + \frac{1,5+j0,5}{s+2-j1} + \frac{1,5-j0,5}{s+2+j1} \right]$$