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

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

$$K_1 = s\,X(s)\Big|_{s=0}$$

$$K_1 = s\,\frac{2s^3 + 8s^2 + 4s + 8}{s(s+1)(s^2+4s+8)} = \frac{8}{8} = 1$$

$$K_1 = 1$$

$$K_2 = (s+1)\,X(s)\Big|_{s=-1}$$

$$K_2 = (s+1)\,\frac{2s^3 + 8s^2 + 4s + 8}{s(s+1)(s^2+4s+8)} = \frac{-2+8-4+8}{(-1)[1-4+8]} = -2$$

$$K_2 = -2$$

$$A = (s+2+j2)\,X(s)\Big|_{s=-2-j}$$

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

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

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

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

$$= -1\,j^2\,j\,8$$

$$= -8(-1)j = j8$$

$2s^3 = 2[-8 - j24 + 24 + j8]$

$= 2[16 - j16]$

$(2s)^3 = 32 - j32$

$8s^2 = 8(-2 - j2)^2 = j64$

$$A = \frac{2s^3 + 8s^2 + 4s + 8}{s(s+1)(s+2-j2)}$$

$32 - j32 + j64 + 4(-2 - j2) + 8 = 32 - j24$ → Numerador

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

Denominador

$$A = \frac{32 + j24}{24 + j8} = \frac{8(4+j3)}{8(3+1)} \cdot \frac{3-1}{3-j} = \frac{15 - j5}{10}$$

$A = 1,5 - j0,5$

$$X(s) = \frac{1}{s} + \frac{-2}{s+1} + \frac{1,5 + j0,5}{s+2+j2} + \frac{1,5 - j0,5}{s+2-j2}$$