Ejercicio voluntario FFT: cálculo de errores indirectos 29/09/2019

a) $R_e = R_1 + R_2$

Valor de $R_e = R_1 + R_2$

Error $(\Delta R_e) = \left|\frac{\partial R_e}{\partial R_1}\right| \Delta R_1 + \left|\frac{\partial R_e}{\partial R_2}\right| \Delta R_2 = |1|\,\Delta R_1 + |1|\,\Delta R_e =$

$= \Delta R_1 + \Delta R_2$

Sabiendo que $R_1 = 23400 \pm 800\ \Omega$

$R_2 = 17350 \pm 160\ \Omega$

$$R_e = [(23400 + 17350) \pm (800 + 160)]\ \Omega =$$

$$= 40750 \pm 960\ \Omega \Rightarrow 41000 \pm 1000\ \Omega$$

e) $R_e = \frac{R_1 \cdot R_2}{R_1 + R_2}$

Valor de $R_e = \frac{R_1 \cdot R_2}{R_1 + R_2}$

Error $(\Delta R_e) = \left|\frac{\partial R_e}{\partial R_1}\right| \Delta R_1 + \left|\frac{\partial R_e}{\partial R_2}\right| \Delta R_2$

$$\left|\frac{\partial R_e}{\partial R_1}\right| \Delta R_1 = \left|\frac{(R_1 \cdot R_2)'(R_1 + R_2) - (R_1 \cdot R_2)(R_1 + R_2)'}{(R_1 + R_2)^2}\right| = \left|\frac{R_2(R_1 + R_2) - (R_1 \cdot R_2)}{(R_1 + R_2)^2}\right| \cdot \Delta R_1$$

$$\left|\frac{\partial R_e}{\partial R_2}\right| \Delta R_e = \left|\frac{(R_1 \cdot R_2)'(R_1 + R_2) - (R_1 \cdot R_2)(R_1 + R_2)'}{(R_1 + R_2)^2}\right| = \left|\frac{R_1(R_1 + R_2) - (R_1 \cdot R_2)}{(R_1 + R_2)^2}\right| \cdot \Delta R_2$$

Valor de $R_e = \frac{23400 \cdot 17350}{23400 + 17350} = 9967,9447$

$$\Delta R_e = \left| \frac{\partial R_e}{\partial R_1} \right| \cdot 800 + \left| \frac{\partial R_e}{\partial R_2} \right| \cdot 100 = 197,7809$$

$$R_e = 30000 \pm 200\ \Omega$$