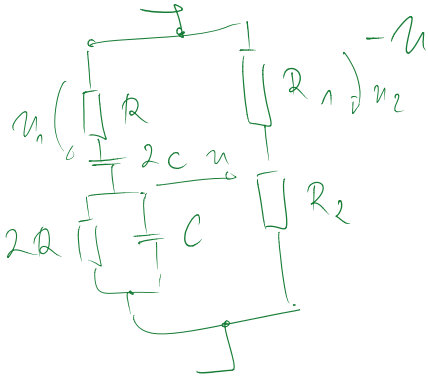
Wienbrücke

Dienstag, 10. September 2013 17:05



$$-U_1 + \frac{R_1}{R_1+R_2}\cdot U_0 - \frac{R+\frac{1}{2j\omega C}}{R+\frac{1}{2j\omega C}+2R\parallel\frac{1}{j\omega C}}U_0 = 0$$

$$\underbrace{\frac{R_1}{R_1+R_2}}_{U_2} = \frac{R+\frac{1}{2j\omega C}}{R+\frac{1}{2j\omega C}+\frac{2R}{2Rj\omega C+1}}$$

$$\frac{R_1}{R_1+R_2} = \frac{2j\omega CR+1}{2j\omega CR+1+\frac{2j\omega CR}{2j\omega CR+1}}$$

$$\frac{R_2}{R_1} = \frac{2j\omega CR}{(2j\omega CR+1)^2}$$

$$\frac{R_1}{R_2} = \frac{(2j\omega CR)^2+4j\omega CR+1}{2j\omega CR}$$

$$\frac{R_1}{R_2} = 2j\omega CR+2+\frac{1}{2j\omega CR}$$

$$\frac{R_1}{R_2} = \underbrace{\left(2\omega CR-\frac{1}{2\omega CR}\right)\cdot j}_{\overset{!}{=}0} + 2$$

$$R_1 = 2R_2$$

$$2\omega CR = \frac{1}{2\omega CR}$$

$$4\omega^2C^2R^2 = 1$$

$$2\omega CR = 1$$

$$\omega = \frac{1}{2CR} \rightarrow f = \frac{1}{4\pi CR}$$