22 $R = \frac{R_1 R_2}{R_1 + R_2}$ $\quad \frac{dR_1}{dt} = 1\,\Omega/s \quad \frac{dR_2}{dt} = 1{,}5\,\Omega/s$

Find $\frac{dR}{dt}$ when $R_1 = 50\,\Omega$ and $R_2 = 75\,\Omega$

$$\frac{dR}{dt} = \frac{\partial R}{\partial R_1} \cdot \frac{dR_1}{dt} + \frac{\partial R}{\partial R_2} \cdot \frac{dR_2}{dt}$$

$$\frac{\partial R}{\partial R_1} = \frac{R_2(R_1 + R_2) - (1)R_1 R_2}{(R_1 + R_2)^2}$$

$$= \frac{R_1 R_2 + R_2^2 - R_1 R_2}{(R_1 + R_2)^2} - \frac{R_2^2}{(R_1 + R_2)^2}$$

22 cont... $\quad \frac{\partial R}{\partial R_2} = \frac{R_1(R_1 + R_2) - (1)R_1 R_2}{(R_1 + R_2)^2}$

$$= \frac{R_1^2 + R_1 R_2 - R_1 R_2}{(R_1 + R_2)^2}$$

$$= \frac{R_1^2}{(R_1 + R_2)^2}$$

$$\therefore \frac{dR}{dt} = \frac{R_2^2}{(R_1 + R_2)^2}(1) + \frac{R_1^2}{(R_1 + R_2)^2}(1{,}5)$$

$$= \frac{(75)^2}{(50 + 75)^2} + \frac{(50)^2}{(50 + 75)^2}(1{,}5)$$

$$= \frac{5625}{15625} + \frac{2500 \times 1{,}5}{15625}$$

$$= \frac{9375}{15625}$$

$$= 0{,}6\,\Omega/s$$