

⊗ Components of F due to uncorrelated noise

From previous page, uncorrelated noise current power

$$= \frac{1}{4R_s^2} \left( \frac{\omega_T}{\omega} \right)^2 \left\{ \overline{v_s^2} + \overline{v_g^2} \right\} + \frac{1}{4} \overline{a^2} + \frac{1}{4} (1+Q^2) \left( \frac{\omega_T}{\omega} \right)^2 \overline{a g^2}$$

$$F \Big|_{\text{due to uncorrelated noise}} = \frac{\frac{1}{4R_s^2} \left( \frac{\omega_T}{\omega} \right)^2 (\overline{v_s^2} + \overline{v_g^2}) + \frac{1}{4} \overline{a^2} + \frac{1}{4} (1+Q^2) \left( \frac{\omega_T}{\omega} \right)^2 \overline{a g^2}}{\frac{1}{4R_s^2} \left( \frac{\omega_T}{\omega} \right)^2 \overline{v_s^2}}$$

$$\frac{1}{4R_s^2} \left( \frac{\omega_T}{\omega} \right)^2 \overline{v_s^2} + \frac{1}{4} \overline{a^2} + \frac{1}{4} (1+Q^2) \left( \frac{\omega_T}{\omega} \right)^2 \overline{a g^2}$$

From previous results

$$= 1 + \frac{R_g}{R_s} + \frac{1}{2Q} \left( \frac{\omega}{\omega_T} \right) \frac{r}{\delta} + R_s^2 (1+Q^2) \frac{\delta}{R_s} \frac{\alpha \omega^2 C_{gs}^2}{5 \cdot g_m}$$

$$= (1+Q^2) \alpha \frac{\delta}{5} \frac{\omega^2 C_{gs}^2 \cdot R_s}{g_m}$$

$$= \left( \frac{1+Q^2}{2Q} \right) \frac{\alpha \delta}{5} \left( \frac{\omega}{\omega_T} \right)$$

$$= 1 + \frac{R_g}{R_s} + \frac{1}{2Q} \left( \frac{\omega}{\omega_T} \right) \frac{r}{\delta} + \left( \frac{1+Q^2}{2Q} \right) \left( \frac{\omega}{\omega_T} \right) \frac{\alpha \delta}{5}$$

$$\begin{aligned} \overline{a g^2} &= 4kT \delta g g \frac{\omega^2 C_{gs}^2}{5 g_{m0}} \\ &= 4kT \delta \alpha \frac{\omega^2 C_{gs}^2}{5 g_m} \end{aligned}$$