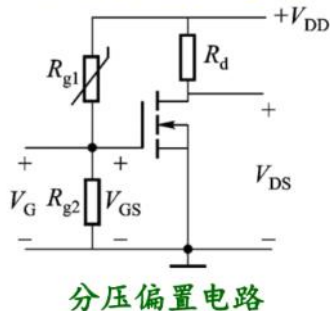


FET 放大电路

2021年1月23日 23:48

静态偏置

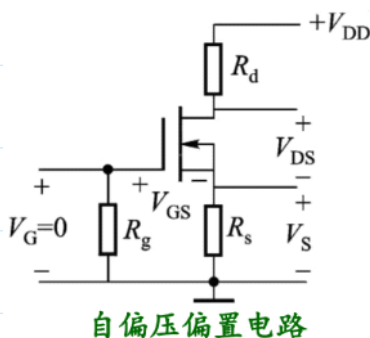
栅极固定偏置电路



用于增强型 NMOS ($V_{GS} > 0$)

$$V_{GSQ} = \frac{R_{g2}}{R_{g1} + R_{g2}} \cdot V_{DD}$$

自偏置电路



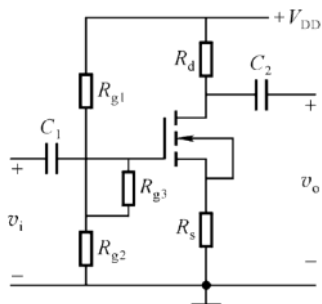
用于耗尽型

$$V_G = 0$$

$$V_{GS} = V_G - V_S = -I_D \cdot R_S$$

$$I_D = I_{DSS} \left(1 - \frac{V_{GS}}{V_P}\right)^2$$

混合偏置

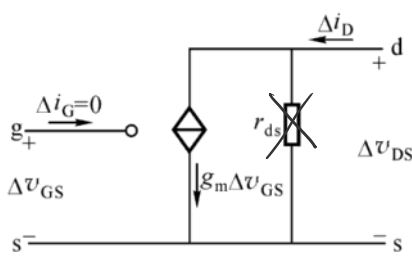
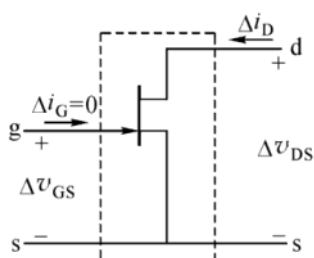


$$V_G = \frac{R_{g2}}{R_{g1} + R_{g2}} V_{DD}$$

$$V_{GS} = V_G - I_D \cdot R_S$$

$$I_D = \dots \text{ 或 } I_{DSS} \left(\frac{V_{GS}}{V_P} - 1\right)^2$$

小信号模型



$$g_m \Delta V_{GS}$$

$$\dots \dots \dots$$

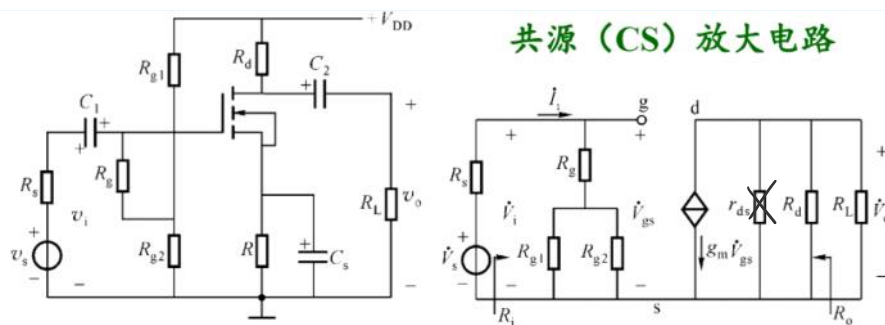
|

$g_m \propto V_{GS}$

r_{ds} 忽略

动态分析

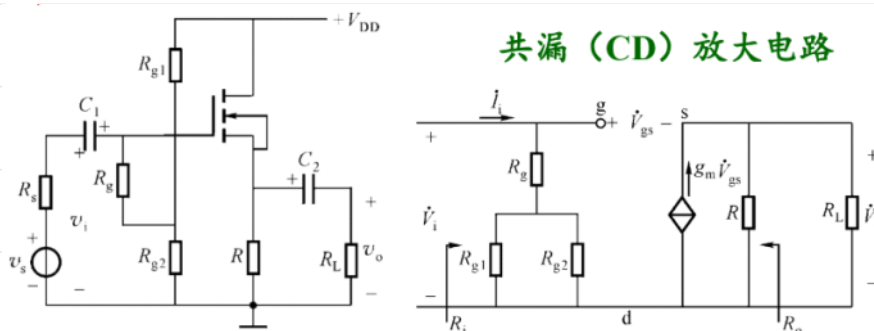
共源 (CS) 放大电路



$$\dot{A}_V = \frac{\dot{V}_o}{\dot{V}_i} = \frac{-g_m \dot{V}_{gs} R_L'}{\dot{V}_{gs}} = -g_m R_L'$$

$$R_i = \frac{\dot{V}_i}{\dot{I}_i} = R_g + R_{g1} // R_{g2} \quad R_o = R_d$$

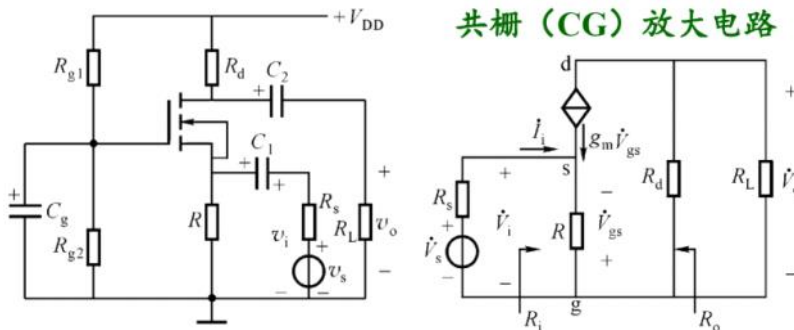
共漏 (CD) 放大电路



$$\dot{A}_V = \frac{g_m \dot{V}_{gs} \cdot R_L'}{\dot{V}_{gs} + g_m \dot{V}_{gs} \cdot R_L'} = \frac{g_m R_L'}{1 + g_m R_L'}$$

$$R_i = R_g + R_{g1} // R_{g2} \quad R_o = R_s // \frac{1}{g_m}$$

共栅 (CG) 放大电路



$$\dot{A}_V = \frac{-g_m \dot{V}_{gs} \cdot R_L'}{-\dot{V}_{gs}} = -g_m R_L'$$

$$R_i = R_s // \frac{1}{g_m} \quad R_o = R_d$$