

## Lab 8: FET gain calculation hint

In the FET part of lab 8, you are asked to calculate the gain for a FET amplifier circuit. The lab instructions say to prove that the gain is

$$G = \frac{g_m R_D}{1 + g_m R_s}$$

while in the book and in the lecture we said that the gain was  $G = g_m R_D$ .

The difference is due to the source capacitor  $C_s$ . In the circuit from the book and the lecture, this capacitor drains away the oscillating part of the source current. In the lab this capacitor doesn't exist, and the source voltage oscillates with the rest of the circuit. Thus, the voltage difference  $\Delta V_{GS}$  is not anymore simply  $\Delta V_{GS} = \Delta V_{in}$  but instead  $\Delta V_{GS} = \Delta V_{in} - \Delta V_s$ .