

EE105 - Fall 2005

Microelectronic Devices and Circuits

Lecture 13

Two-Port Models

Common-Source Amplifiers Revisited

Announcements

- › **Homework 6 due today**
- › **No labs this week**
 - › Lab 5 next week
- › **Reading: Chapters 9.4, 8 (MOS only)**
- › **Midterm 1 on Thursday**
 - › October 13, 6:30-8pm, Sibley
- › **Review session today**
 - › October 11, 6:30-8pm, 277 Cory
- › **No office hour next Monday**
 - › Please come and see me after the lecture on Tuesday

Lecture Material

- › Last lecture
 - › MOS current sources
- › This lecture
 - › Generalized two-port models
 - › Common-source amplifier (again)

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Maximize Gain of CS Amp

$$A_v = -g_m R_D \parallel r_o$$

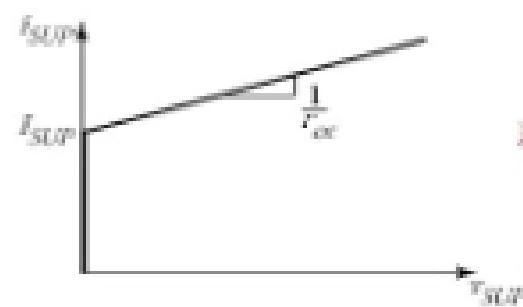
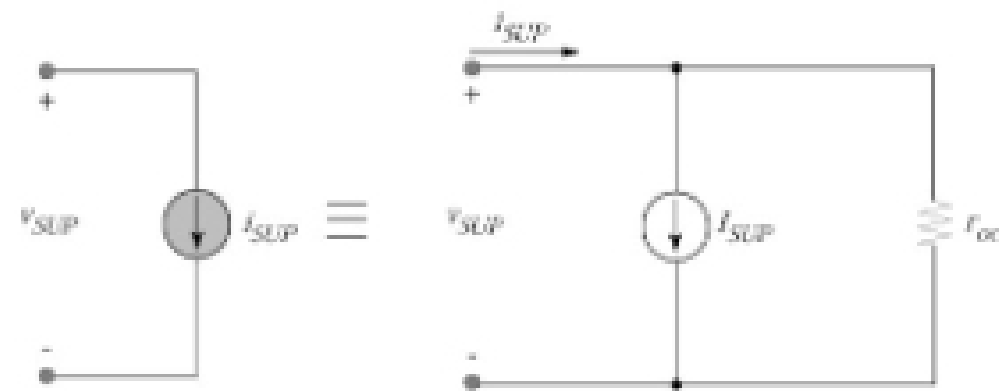
- › Increase g_m (more current)
- › Increase R_D (free? Don't need to dissipate extra power)
- › **Limit: Must keep the device in saturation**

$$V_{DS} = V_{DD} - I_D R_D > V_{DS,sat}$$

- › **For a fixed current, the load resistor can only be chosen so large**
- › **To have good swing we'd also like to avoid getting to close to saturation**

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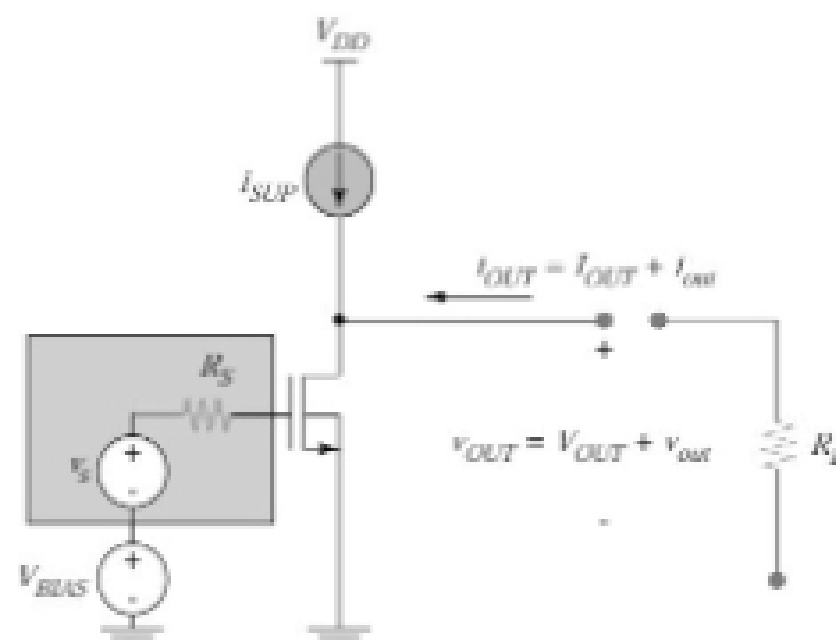
Current Source Supply



- > **Solution: Use a current source!**
- > **Current independent of voltage for ideal source**

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CS Amp with Current Source Supply



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