Control Systems

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Contents

Abstract—**This manual is an introduction to control systems in feedback circuits. Links to sample Python codes are available in the text.**

Download python codes using

```
svn co https://github.com/gadepall/school/trunk/
    control/feedback/codes
```


2.1 Ideal Case

2.1. The feedback current amplifier in fig.**??** can be thought of as a "super" CG transistor. Note that rather than connecting the gate of Q_2 to signal ground, an amplifier is placed between source and gate.

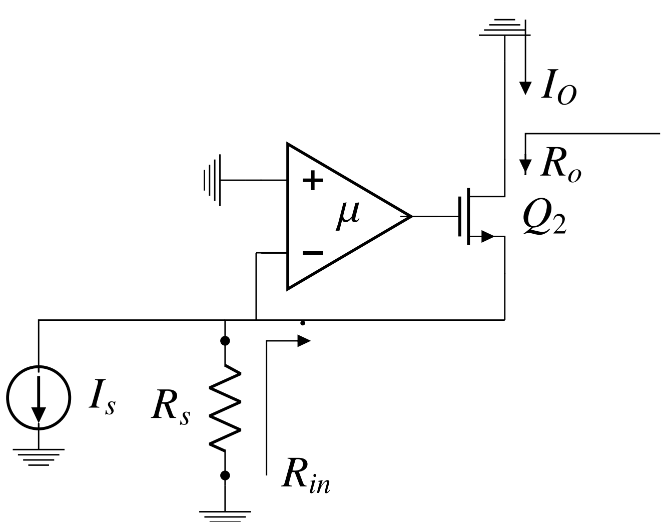

Fig. 2.1

for the fig.**??** , the parameter's table is TABLE.**??**

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Parameter	Value
input resistance(large μ)	0
output resistance(large μ)	∞
Input voltage	$-I_sR_s$
input resistance(finite μ)	R_s
output resistance(finite μ)	r_o
source resistance	R_s
feedback factor H	**1**
Open Loop Gain, G	$\mu g_m R_s\ A/A$
Closed Loop Gain, T	**1 A/A**

TABLE 2.1

2.2. **(a) If μ is very large, what is the signal voltage at the input terminal?What is the input resistance?What is the current gain Io/Is ?**

Solution:
Refer to the fig. **??** for the feedback current amplifier circuit, in this super common gate transistor is connected between the gate and source terminals of the MOSFET.
Replace the op-amp with its equivalent modal and replace the MOSFET with its small signal equivalent circuit.
with reference to the fig,**??**. For ideal op-amp,the input resistance(R_{id}) is very high (infinite) . And the drain current is approximately equal to source current

$$I_D \cong I_S \tag{2.2.1}$$

The closed loop gain of op-amp is

$$T = \frac{\mu}{1 + \mu H} \tag{2.2.2}$$

for larger value of closed loop gain , open loop gain 'μ' will be large. from fig.**??** we can observe that input voltage is,

$$V_{in} = -R_s I_s \tag{2.2.3}$$

Since the drain current is approximately is equal to source current, And the current flowing through resistor R_S is I_s since there is no