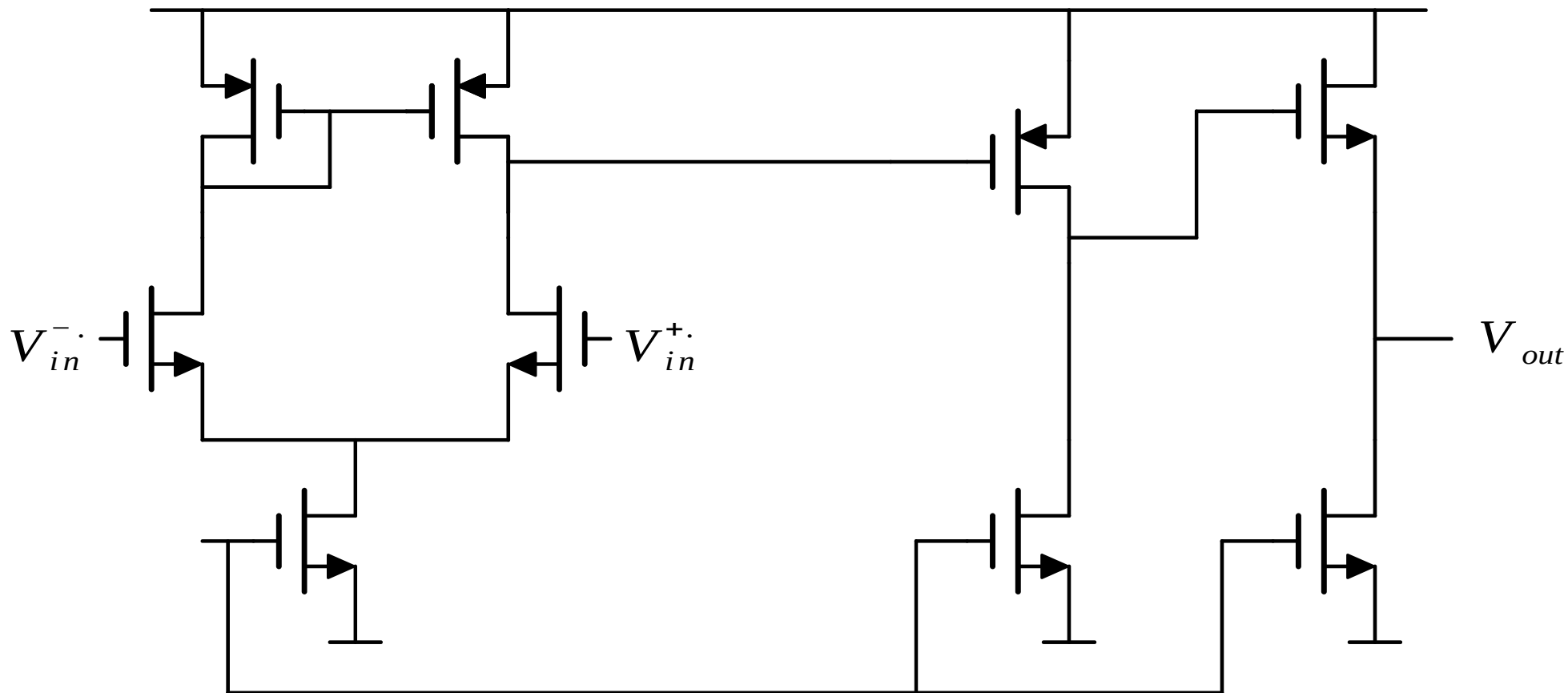
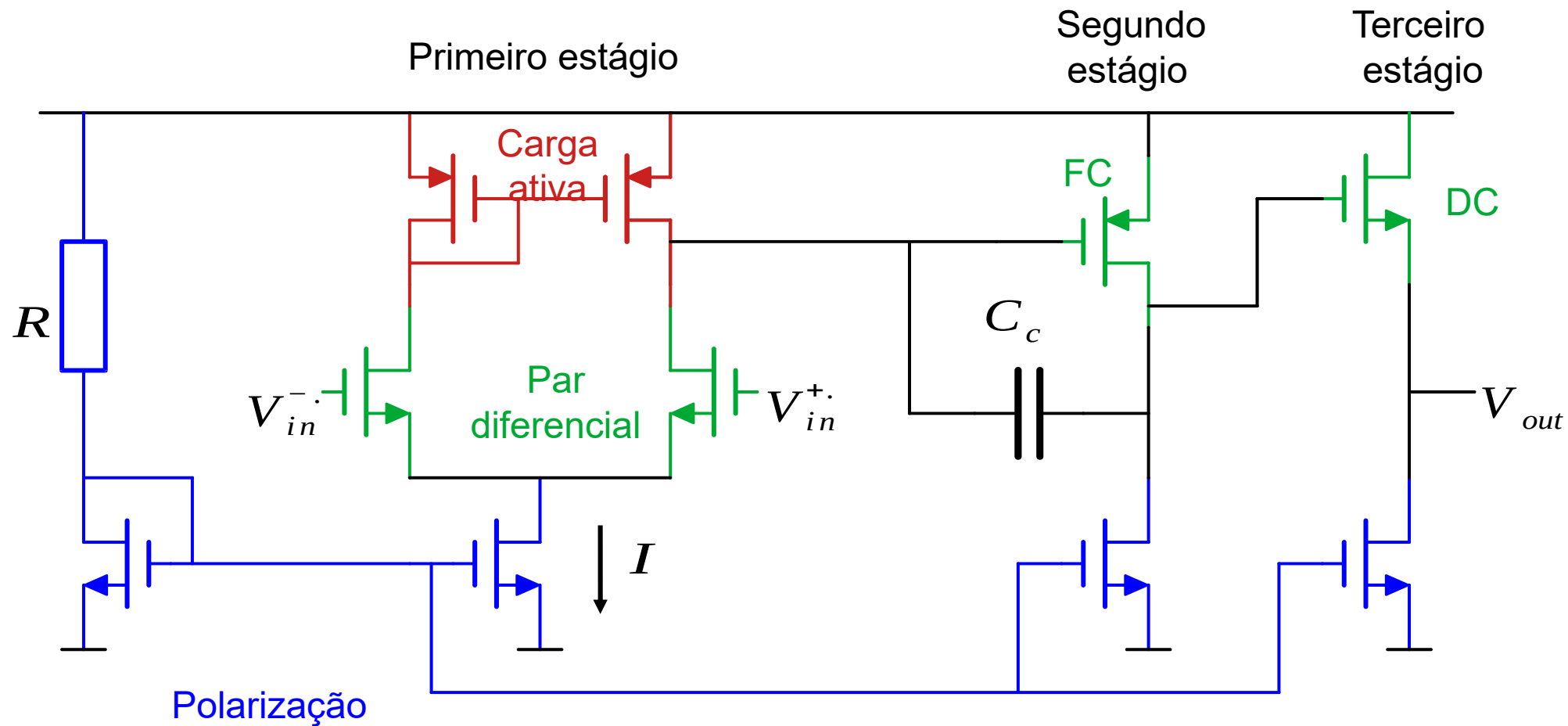
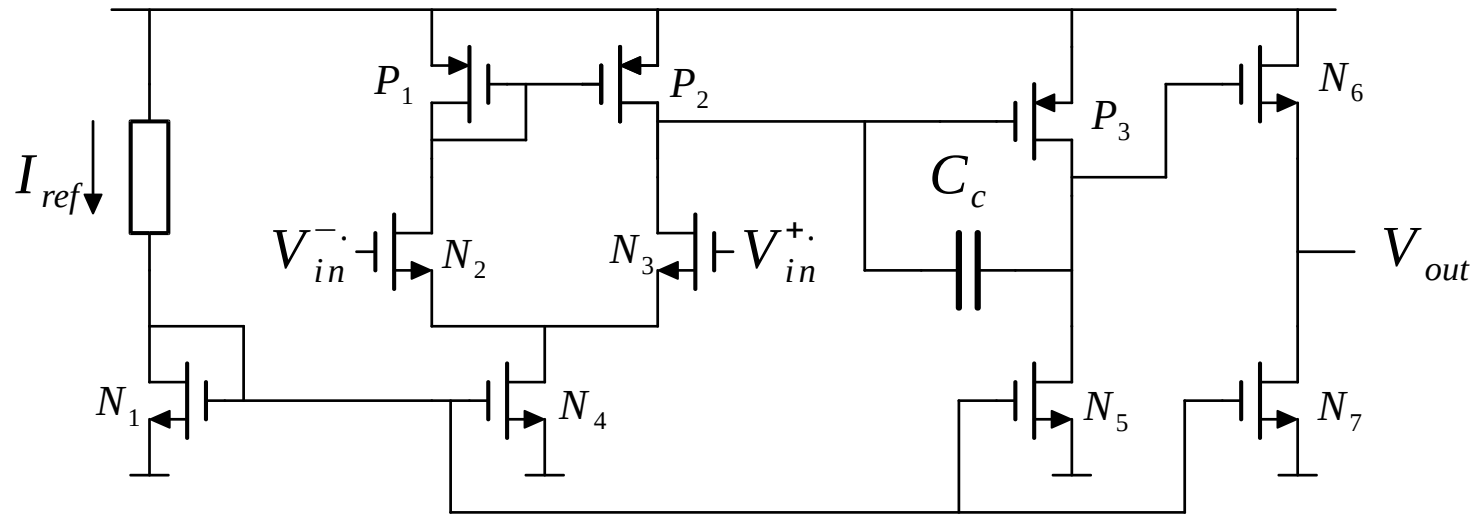








$$I_{ref} = 1 \text{ mA}$$

$$W_1 = 1 \mu \text{ m}$$

$$W_4 = 4 \mu \text{ m}$$

$$W_5 = 10 \mu \text{ m}$$

$$W_7 = 25 \mu \text{ m}$$

$$C_c = 10 \text{ pF}$$

$$\lambda_n = 0.01 \text{ V}^{-1}$$

$$\lambda_p = 0.01 \text{ V}^{-1}$$

Obter R_{in} , R_{out} e A_{v0} do amplificador operacional

Obter o diagrama de Bode do amplificador de tensão

$$ID3 = 2.0000\text{e-}03$$

$$gm3 = 4.0000\text{e-}03$$

$$ron3 = 50000$$

$$rop2 = 50000$$

$$Av01 = -100$$

$$ID5 = 0.010000$$

$$rop3 = 10000$$

$$gmp3 = 0.016000$$

$$Av02 = -160$$

$$Av03 = 1$$

$$ID7 = 0.025000$$

$$gm6 = 0.010000$$

$$ro1 = 25000$$

$$C1 = 1.6100\text{e-}09$$

$$C2 = 1.0063\text{e-}11$$

$$fp1 = 3954.2$$

$$fp2 = 1.5817\text{e+}06$$

$$R_{in} = \text{Inf}$$

$$R_{out} = 100$$

$$ro7 = 4000.0$$

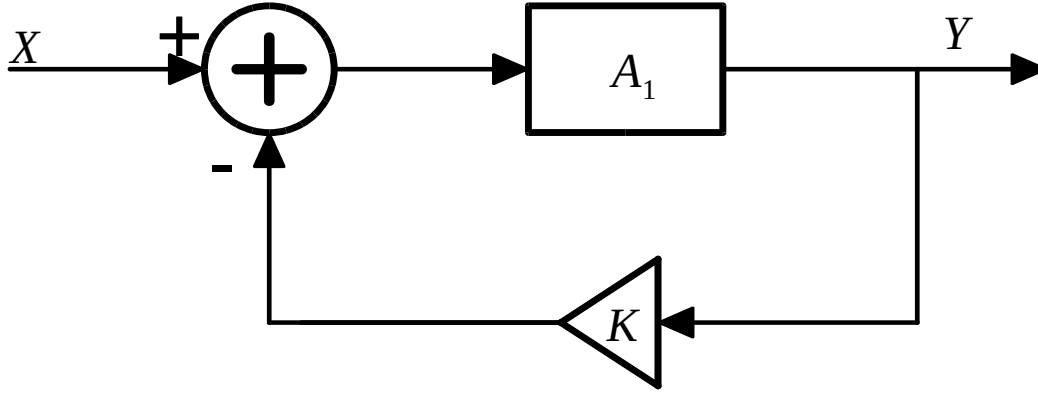
$$R_{out} = 97.561$$

$$Av0 = 16000$$

$$\mu_n C_{ox} W_3 / L = 4 \text{ mA/V}^2$$

$$\mu_n C_{ox} W_6 / L = 2 \text{ mA/V}^2$$

$$\mu_p C_{ox} W_3 / L = 12.8 \text{ mA/V}^2$$

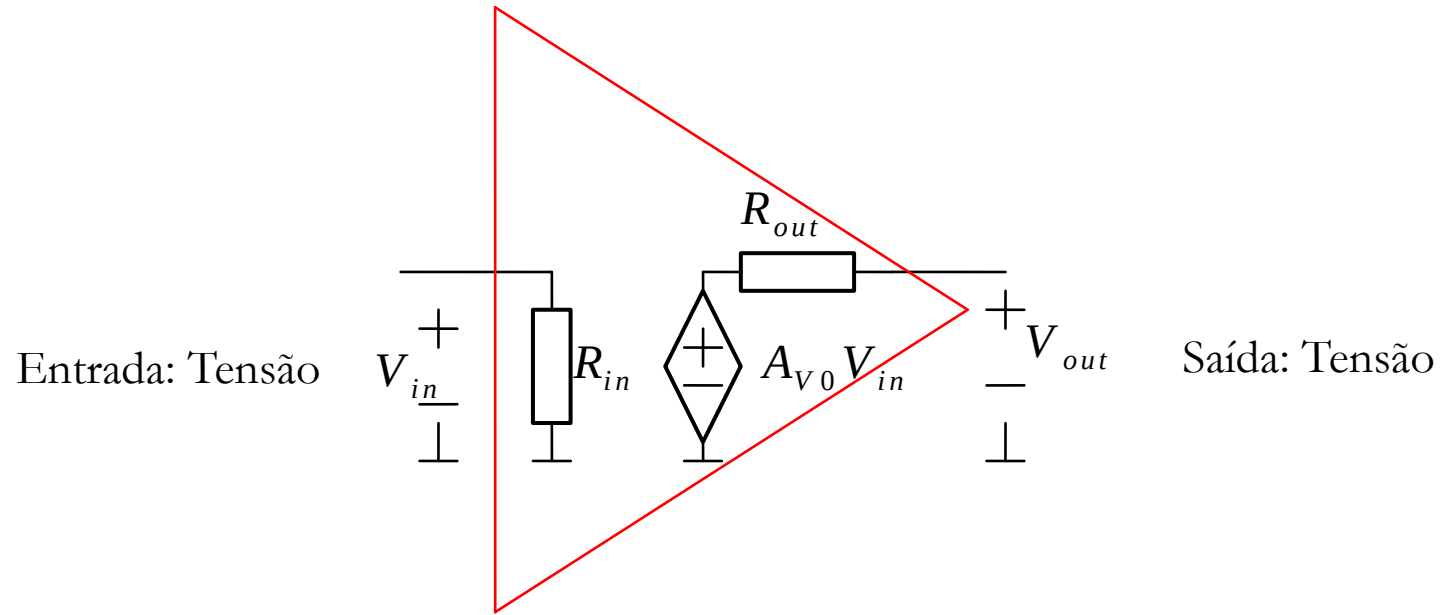


$$\frac{Y}{X} = \frac{A_1}{1 + KA_1}$$

Propriedades:

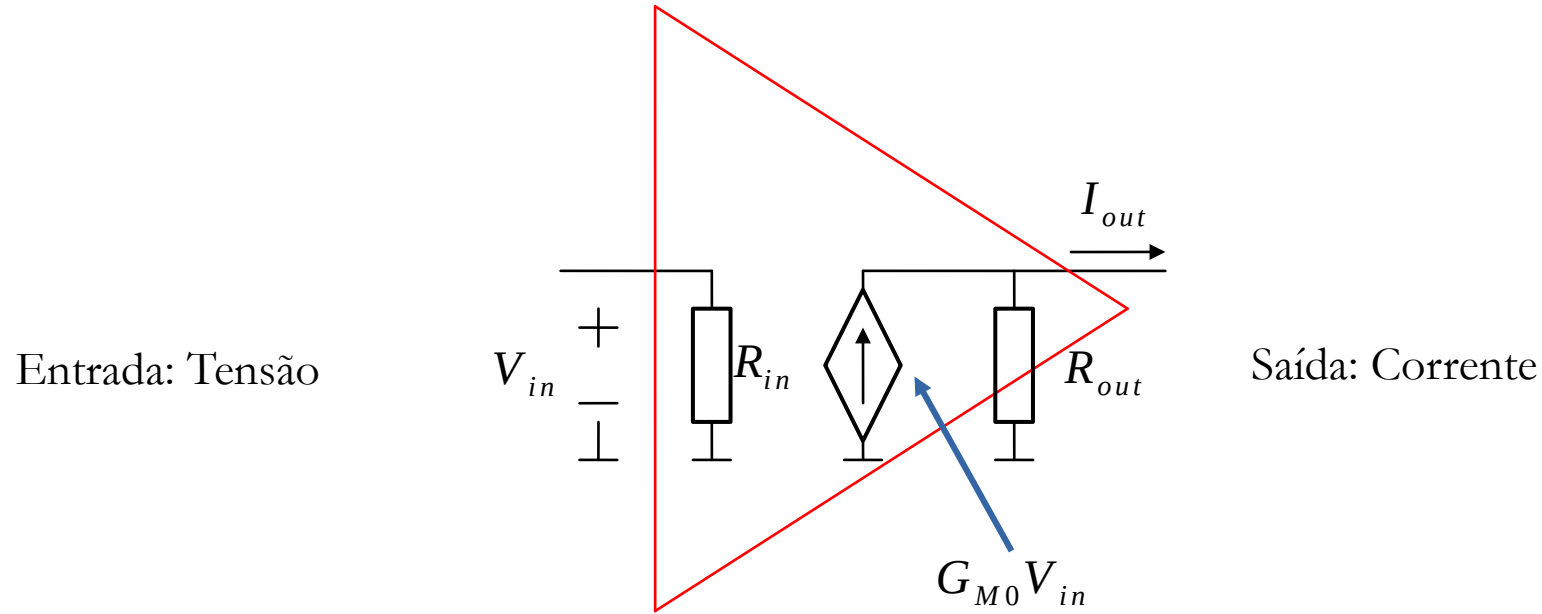
- 1) Dessensibilização do ganho
- 2) **Extensão da largura de banda**
- 3) Altera as impedâncias de entrada e de saída
- 4) Melhora a linearidade

Modelo de amplificador de tensão



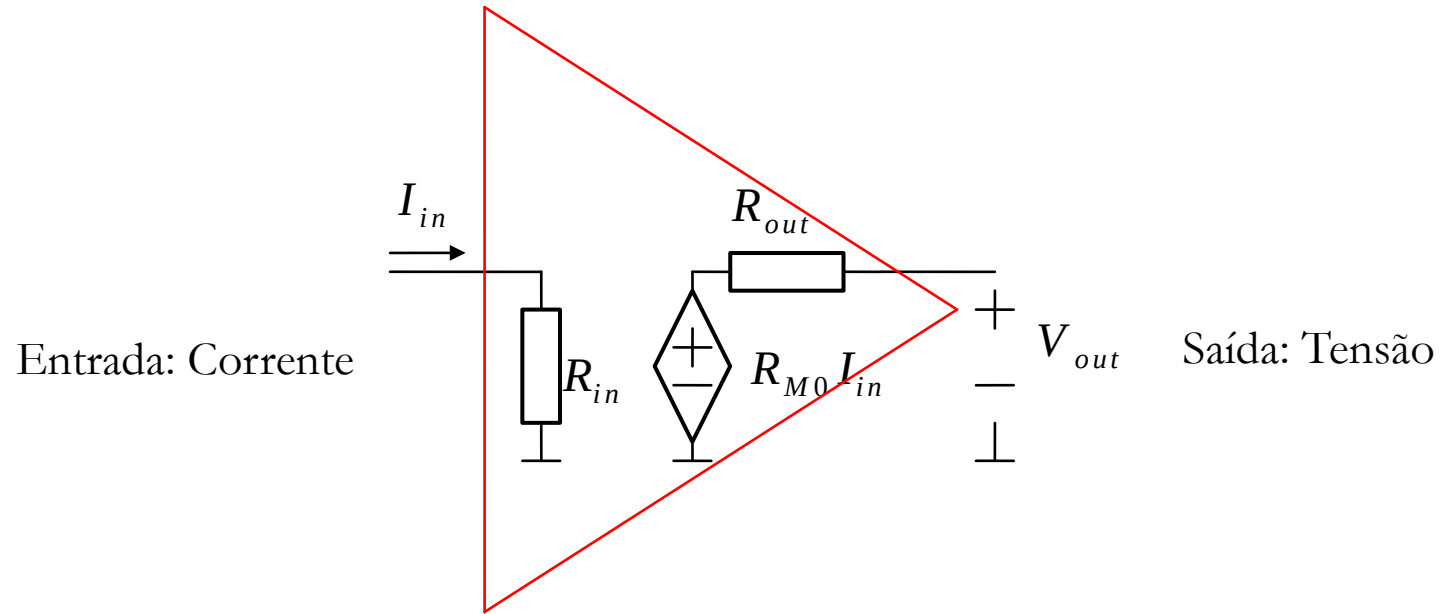
Idealmente, a resistência de entrada (R_{in}) é infinita e a resistência de saída (R_{out}) é zero

Modelo de amplificador de transcondutância



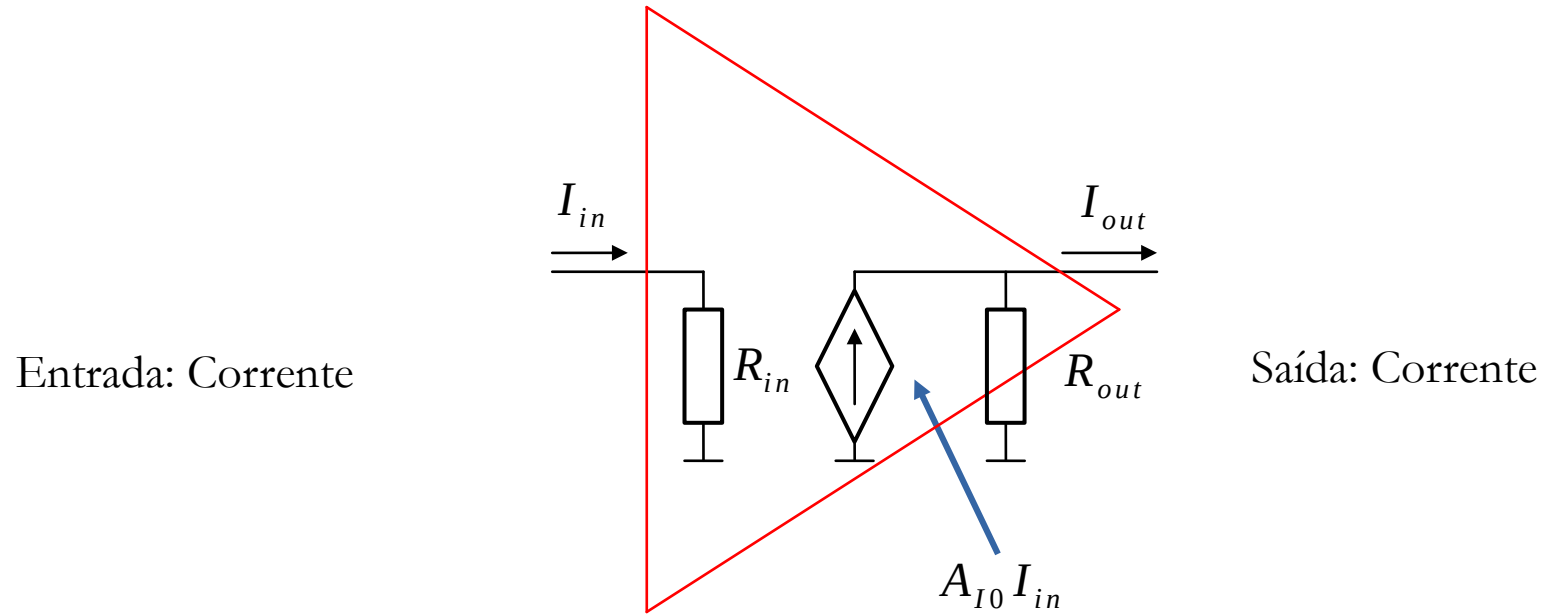
Idealmente, a resistência de entrada (R_{in}) é infinita e a resistência de saída (R_{out}) é infinita

Modelo de amplificador de transresistância



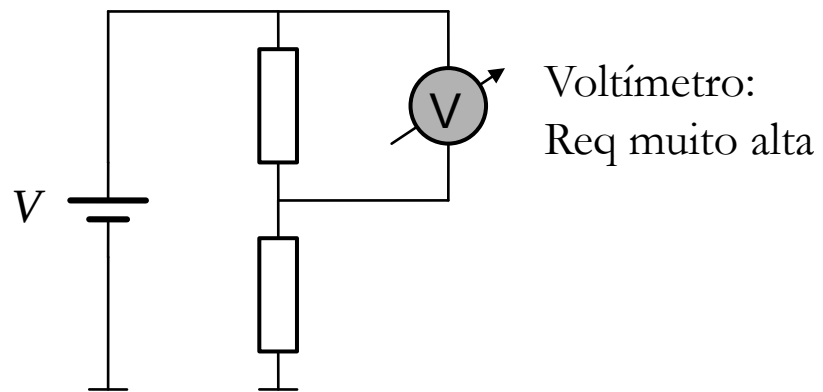
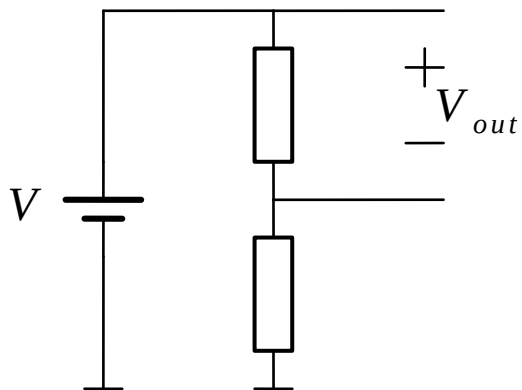
Idealmente, a resistência de entrada (R_{in}) é zero e a resistência de saída (R_{out}) é zero

Modelo de amplificador de corrente

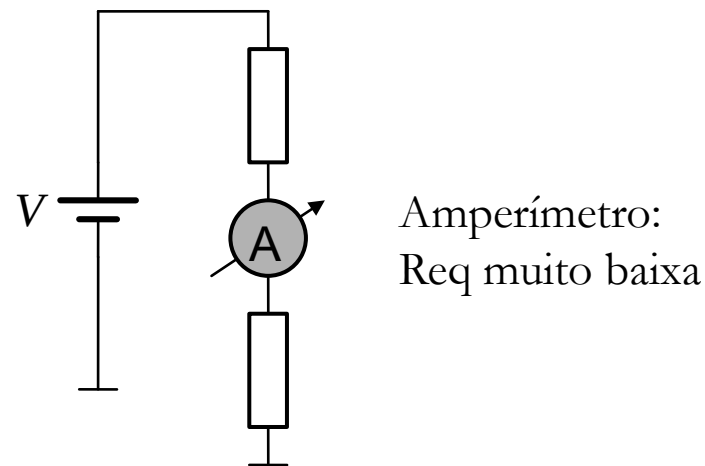
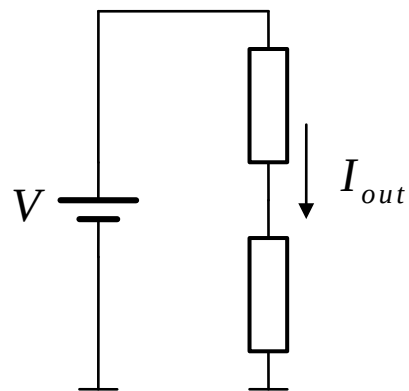


Idealmente, a resistência de entrada (R_{in}) é zero e a resistência de saída (R_{out}) é infinita

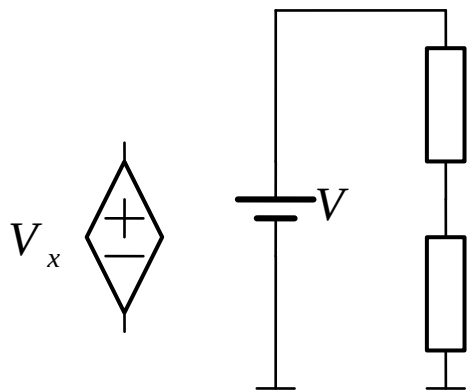
Amostragem de tensão



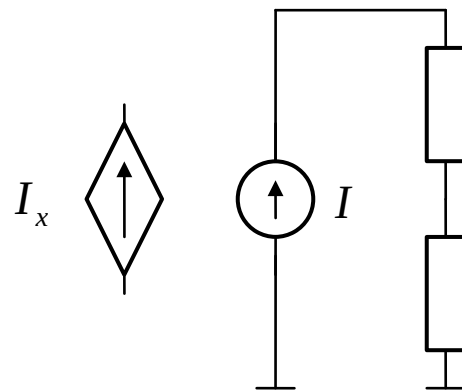
Amostragem de corrente



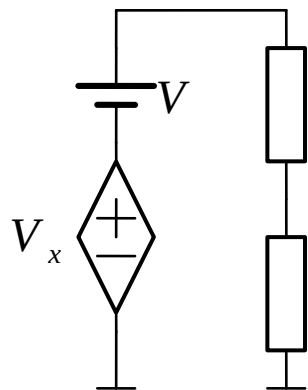
Somar/subtrair de tensão



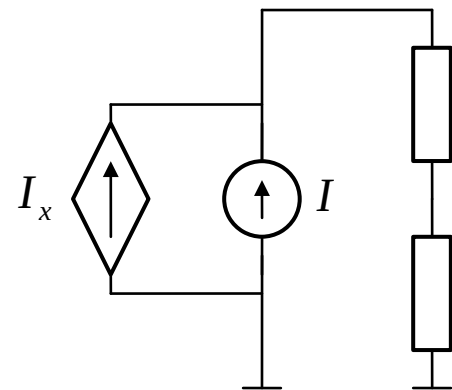
Somar/subtrair de corrente



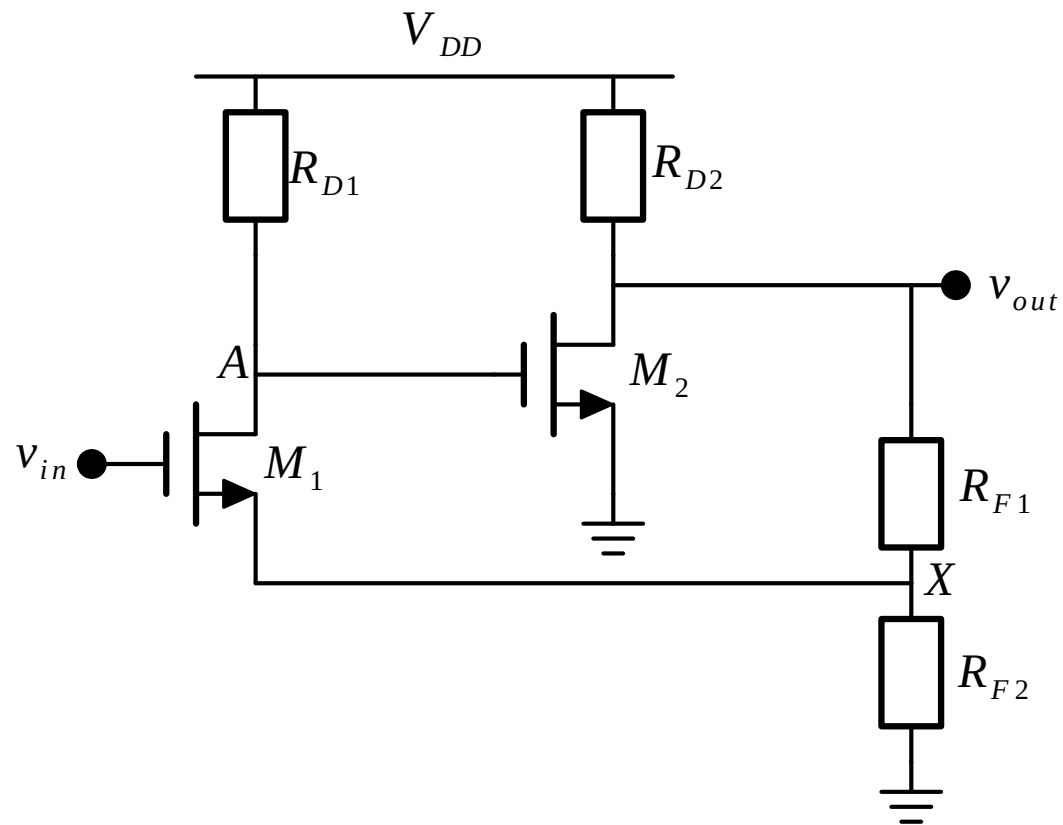
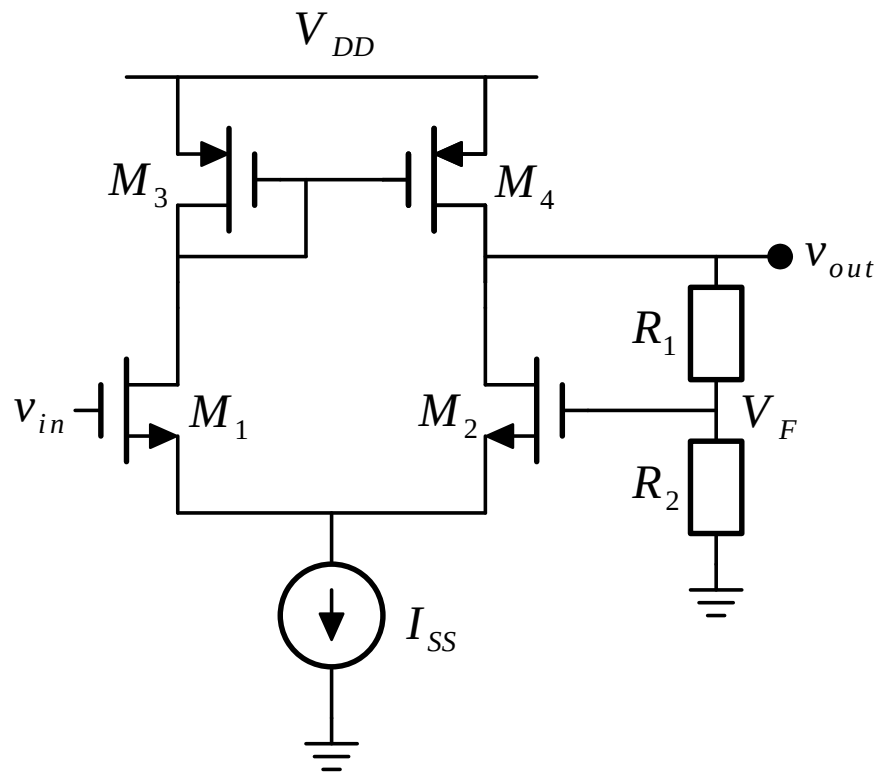
Fonte de tensão:
Req muito baixa



Fonte de corrente:
Req muito alta



Verificar os circuitos e detectar a polaridade da realimentação



Exercício: Detectar os componentes da realimentação e determinar se é uma realimentação positiva ou negativa

