Métodos Experimentais em Física dos Materiais – FMT2501

2º Semestre de 2009

Instituto de Física
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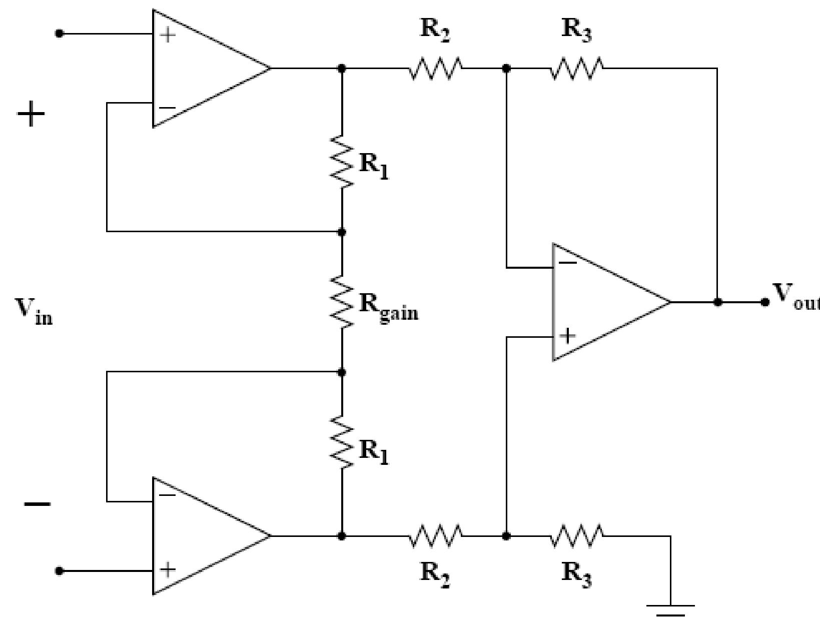
16/setembro

Entrada diferencial

Wikipedia:

An instrumentation (or instrumentational) amplifier is a type of differential amplifier that has been outfitted with input buffers, which eliminate the need for input impedance matching and thus make the amplifier particularly suitable for use in measurement and test equipment.

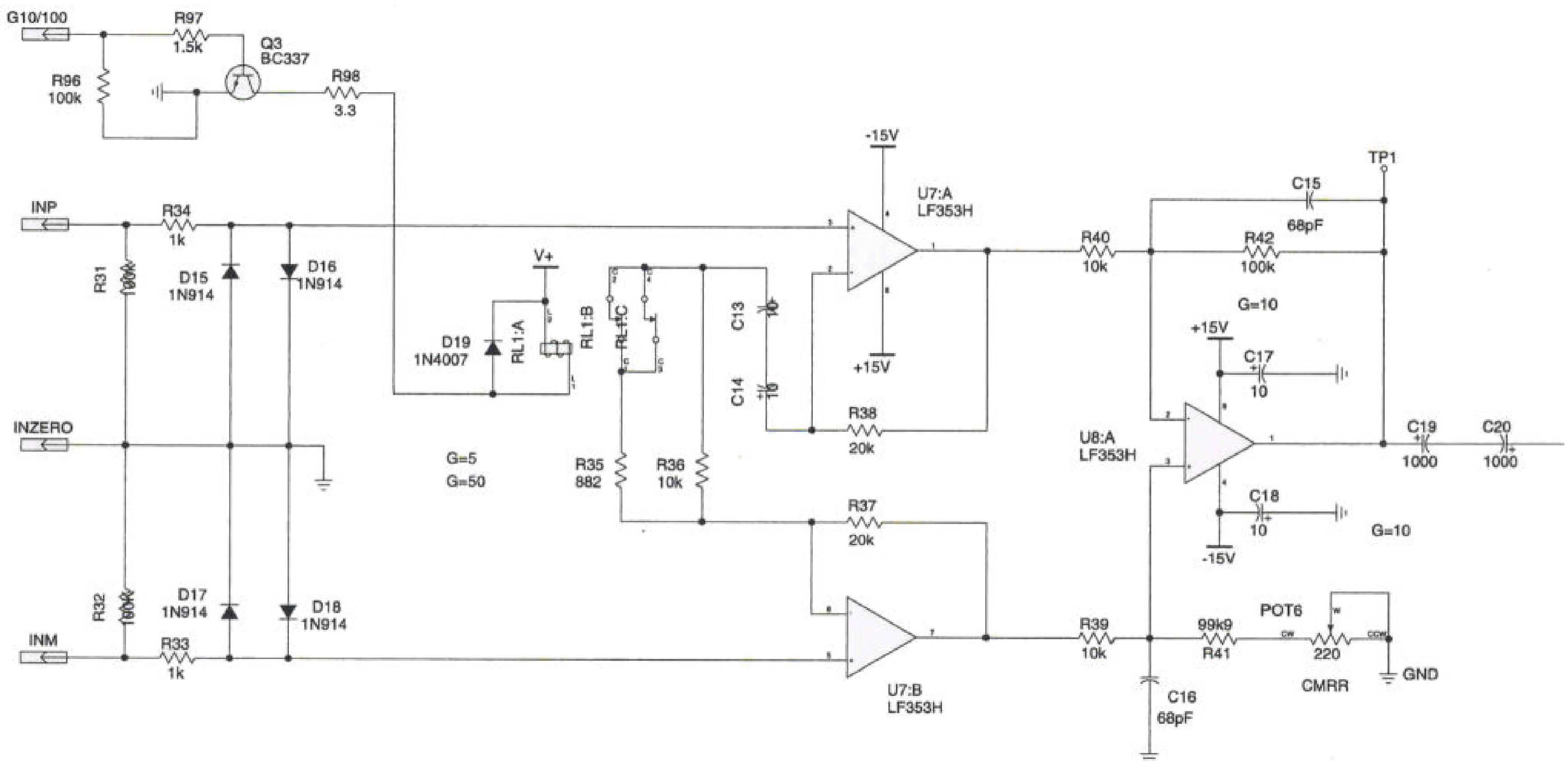
Additional characteristics include very low DC offset, low drift, low noise, very high open-loop gain, very high common-mode rejection ratio, and very high input impedances. Instrumentation amplifiers are used where great accuracy and stability of the circuit both short- and long-term are required.



$$\frac{V_{\text{out}}}{V_2 - V_1} = \left(1 + \frac{2R_1}{R_{\text{gain}}}\right)\frac{R_3}{R_2}$$

Entrada diferencial

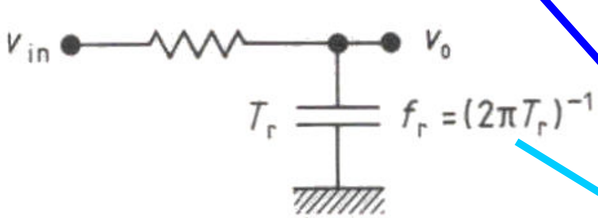
$$\frac{V_{out}}{V_2 - V_1} = \left(1 + \frac{2R_1}{R_{gain}}\right)\frac{R_3}{R_2}$$



$$v = \frac{4A}{\pi} \sum_{n=impar} \frac{\sin(2\pi n f_o t)}{n}$$

Resposta em frequência (vista espectral)

Filtro passa-baixas



Para um sinal non-senoidal de frequência f_o

(série de Fourier)

$$v = A_0 + \sum_{n=1}^{\infty} \left[A_n \cos(2\pi n f_o t) + B_n \sin(2\pi n f_o t) \right]$$

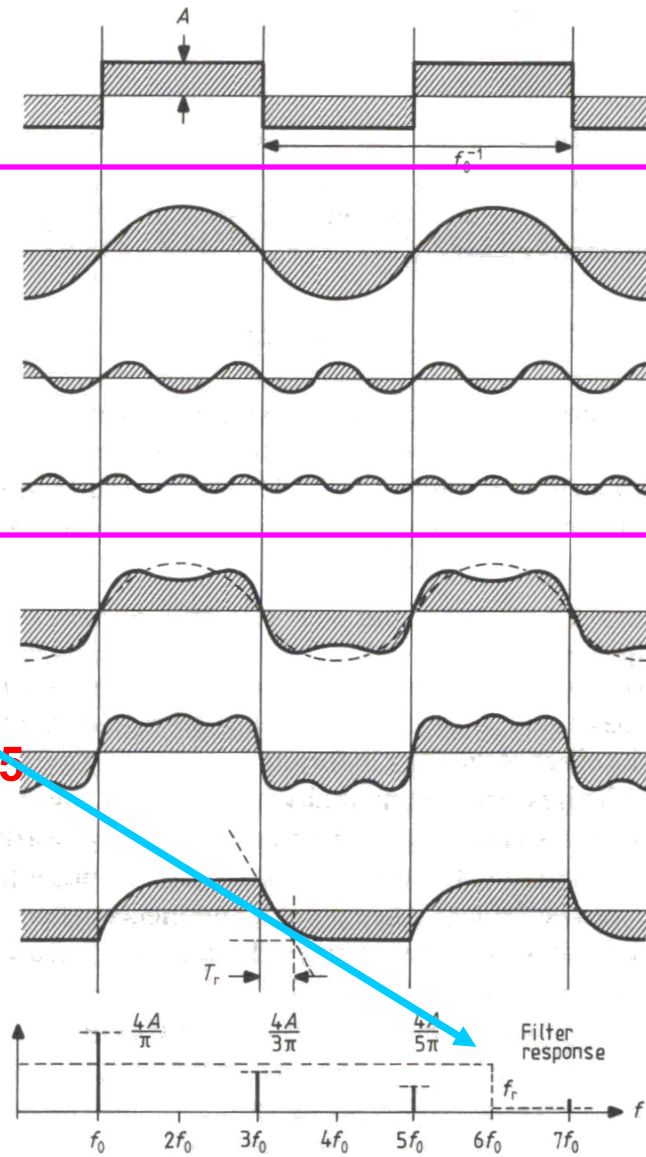
n= 1

n= 3

n= 5

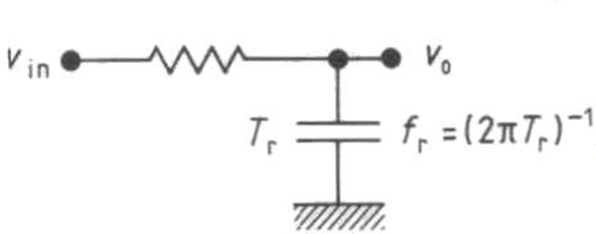
1+3

1+3+5



Resposta em frequência (vista espectral)

Filtro passa-baixas



$$V_C = v_{0c} \exp[j(2\pi ft + \phi_c)]$$

$$I_c = C\frac{dV_c}{dt} = j2\pi fCV_c$$

$$\therefore Z_c = \frac{V_c}{I_c} = \frac{1}{j2\pi fC} = \frac{1}{j\omega C}$$

$$V = v_0 \exp[j(2\pi ft + \phi)] =$$
$$= v_0 \cos(2\pi ft + \phi) + jv_0 \sin(2\pi ft + \phi)$$

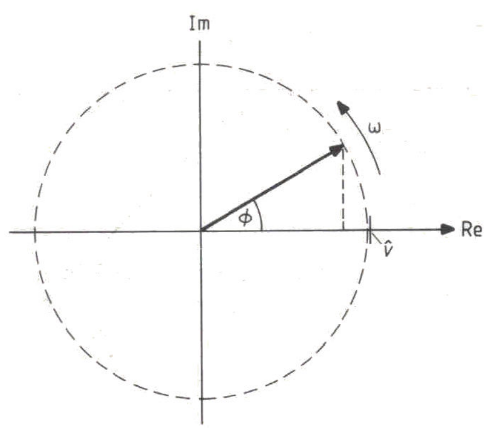
$$V_{in} = (R + Z_c)I$$

$$V_{out} = Z_c I$$

$$\therefore V_{out} = \frac{Z_c}{R + Z_c} V_{in}$$

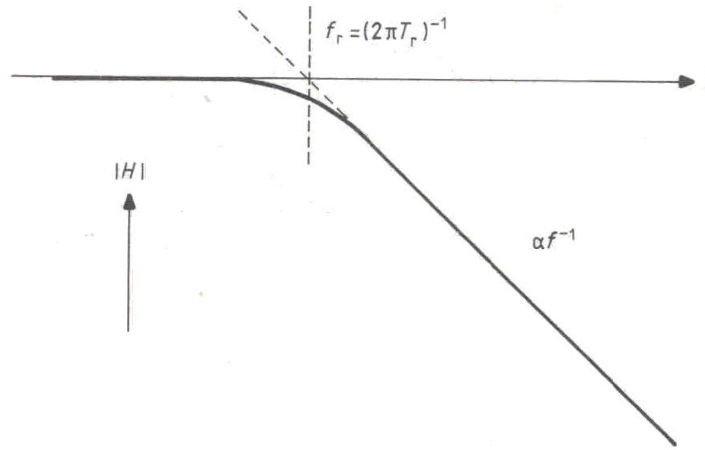
$$V_{out} = \frac{1}{1 + j\omega / \omega_r} V_{in}$$

Fasor

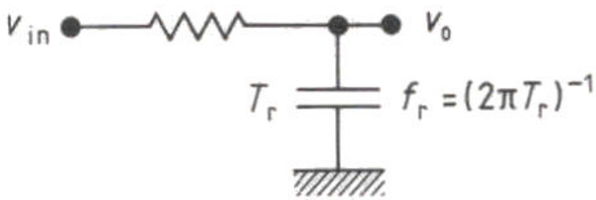


Phasor representation of $V = \hat{v} \exp[j(\omega t + \phi)]$

Resposta em frequência (vista espectral)



Filtro passa-baixas



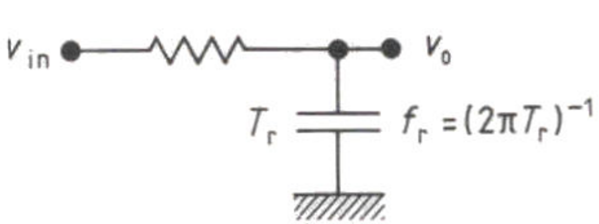
$$V_{out} = \frac{1}{1 + j\omega / \omega_r} V_{in}$$

$$V_{out} = T_r^{-1} \int_{t-T_r}^{t} v_{in} \exp(j\omega t') dt'$$

$$V_{out} = V_{in}(t) \exp(-j\omega T_r / 2) \frac{\sin(\omega T_r)}{\omega T_r / 2}$$

Resposta em frequência (vista espectral)

Filtro passa-baixas



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