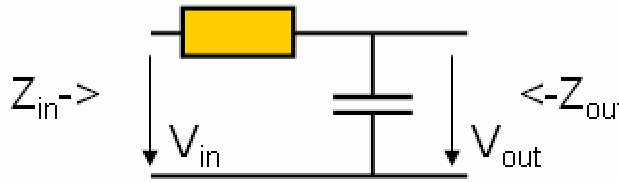
Note to earlier lecture: LP-filter is an approximation of the ideal integrator



$$H(f)V_{in}(f)=V_{out}(f)$$

$$H(f)=\cancel{I(f)}Z_{out}(f)/[\cancel{I(f)}Z_{in}(f)]=Z_{out}(f)/Z_{in}(f)$$

$$H(f)=\frac{(j\omega C)^{-1}}{R+(j\omega C)^{-1}}=\frac{1}{j\omega RC+1}$$

$$H(f)\approx\frac{1}{j\omega RC},\omega>>1$$

Ideal integrator is defined by

$$V_{out}(f)=\mathcal{F}\left[\int_{-\infty}^{t}v_{in}(\lambda)d\lambda\right]=\frac{V_{in}(f)}{j2\pi f}+\frac{1}{2}V_{in}(0)\delta(f)$$

$$V_{out}(f)\Big|_{V_{in}(t)=\delta(t)}=\frac{1}{j2\pi f}+\frac{1}{2}\delta(f)$$

$$\mathcal{F}\left[\delta(t-\tau_d)\right]=\exp(-j\omega\tau_d)$$

