\[ V_{out} = A_{oc} (V_+ - V_-) \]

\[ A_{oc} \to \infty \]

\[ i = \frac{V_{in} - V_+}{R_1} = \frac{k - V_{out}}{R_2} \]

\[ \frac{V_{out}}{V_{in}} = -\frac{R_2}{R_1} \]

\[ V_{in} \quad \text{Vin} \]

\[ V_{out} \quad \text{Vout} \]

\[ t \]
\[ i = \frac{V_{in}}{R_1} = \frac{-V_{out}}{R_2 \parallel \frac{1}{j\omega C}} \]

\[ A_v = \frac{V_{out}}{V_{in}} = \frac{-R_2}{R_1 R_2 j\omega C + R_1} \]

\[ A_v(\omega) = -\frac{R_2}{R_1} \]

\[ |A_v| = \frac{|-R_2/R_1|}{R_2/R_1} \]

\[ \text{denom} \]

\[ R_1 \quad \omega \]

\[ R_2 \quad \text{denominator} \]
\[ W_c \rightarrow \text{Power Gain} \]
\[ = \frac{1}{2} \max \]
\[ |\text{Denominator}| = \sqrt{2} \]
\[ R_1 R_2 W_c = R_1 \]
\[ w_c = \frac{1}{R_2 C} \]
\[ A_v(w_c) = \frac{A_v(0)}{\sqrt{2}} \]
\[ A_p(w_c) = \frac{A_p(0)}{2} \]
\[ 10 \log A_p(w_c) = 10 \log A_v(0) - 3 \text{dB} \]
$V_{in}$

$V_{out}$

$V_{out}$

Buffer

$V_{in} \rightarrow V_{out}$

$V_{in} \rightarrow V_{out}$

$A_v = \frac{R_2 + R_1}{R_1}$
Diff. Amp

\[ V_0 = A_D (V_{i2} - V_{i1}) \]

\[ |A_{cm}| < 10^{-4} \]

\[ |A_D| = 1000 \]

\[ \text{want } < 10 \text{ mV} \]

\[ \text{CMRR} = 20 \log \frac{1000}{10^{-4}} = 140 \text{dB} \]