Loading f/ the FB Network

Ex: Series-Short FB (now including loading from the FB network).

Series Connection: resistance and voltage sources add when in series, so represent amplifier + FB networks by R2 + V FB to make math simpler.

Parallel Connection: conductance and current sources add when in parallel, so represent amplifier + FB networks by G2 + I FB to make math simpler.

For these representations, use h-parameter networks for a f.

\[
\begin{align*}
\text{h}_{11} &= \frac{v_{c}}{i_{c}} \\
\text{h}_{12} &= \frac{v_{c}}{i_{c2}} \\
\text{h}_{21} &= \frac{v_{c2}}{i_{c}} \\
\text{h}_{22} &= \frac{v_{c2}}{i_{c2}}
\end{align*}
\]

h-parameter equivalent of series-shunt FB f:

In general, transfer amplifier + FB networks are uni-directional → they have large gains in the forward direction, but very small gains in the reverse:

\[
\begin{align*}
|\text{h}_{122}| &\ll |\text{h}_{22}| \quad \text{reject } \text{h}_{122} \text{ (set to 0)} \\
|\text{h}_{111}| &\gg |\text{h}_{22}| \quad \text{reject } \text{h}_{111} \text{ (set to 0)}
\end{align*}
\]
The key to inspection analysis of FB circuits: When FB impedance is equal to the basic amplifier, then we can use "inspection" formulas.