Loading f/ the FB Network

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

- **Series Connection:** resistive or capacitive gains added when in series. To represent amplifier and FB network by $R_j$ and $A_j$ to make the math simpler.

- **Shunt Connection:** conductance or current gains added when in parallel. To represent amplifier and FB network by $G_j$ and $V_j$ to make the math simpler.

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

\[
\begin{align*}
\mathbf{h}_{11} &= h_{11} + h_{21}V_2 \\
\mathbf{h}_{12} &= h_{21}V_2 + h_{22}h_{22} \\
\mathbf{h}_{21} &= h_{21}V_2 \\
\mathbf{h}_{22} &= h_{22}h_{22} \\
\end{align*}
\]

h-parameter representation of the series-shunt FB ckt.

In general, translinear amplifier and FB network are uni-directional. They have large gains in the forward direction, but very small gains in the reverse:

\[|\mathbf{h}_{12a}| \ll |\mathbf{h}_{12e}| \rightarrow \text{reject } h_{12a} \text{ (set to 0)}\]

\[|\mathbf{h}_{12e}| \ll |\mathbf{h}_{12a}| \rightarrow \text{reject } h_{12e} \text{ (set to 0)}\]
Loading f/ the FB Network

- The key to inspection analysis of FB effects: We often need to load the basic amplifiers, hence we use our "inspection" formulas.

\[ R_2 = R_3 + h_{fe} + h_{ie} \]
\[ Y_6 = Y_5 + h_{oe} + h_{oe} \]
\[ \frac{N_6}{N_6} = A = \frac{1}{1 + \alpha} \]  
\[ f = h_{fe} \left( \frac{R_3}{R_2} \right) \]