Spectre Noise Analysis

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Making Resistors Noiseless

- Use AnalogLib→res component
- Set “Generate noise” parameter to No
Plotting Results
Direct Plot Form

- Can change units to PSD or VSD
- Add plots to outputs
Plotting Results

- Note that this model didn’t have flicker noise
- VN2() is output noise. Can plot input noise and change the units
- Understand the frequency response effects when plotting input noise and see if the plot makes sense!
Noise Summary Reports
Noise Summary Reports

The above noise summary info is for noise data.
Use the filters appropriately for the noise reports
Create a new transient simulation, open the transient options form, then add the transient noise parameters to the Additional Options field.

- noiseseed=1, noisefmax=10G, noisescal=1
Transient Noise Simulation

- Use FFT to interpret noise spectrum
Sampled Circuit Noise Analysis

- Use .pnoise along with .pss analysis
  - Look at the Spectre PSS setup slides

- PNOISE analysis works similar to the .noise analysis for CT circuits
  - Same plotting and noise report forms as shown for .noise analysis
- We can only set the number of harmonics to 0 by choosing Shooting method
- tstab parameter can be obtained by tran analysis first
Go to Simulation → Options → Analog → Main in the ADE window to setup tolerance options accordingly. If the frequency of periodic small signal analyses followed by PSS is high (e.g. 1G), the maxacfreq parameter (options → accuracy) of the PSS can be used to specify the highest frequency, otherwise, the frequency analysis in PAC maybe truncated.
- Simulation of noise in sampled circuits
- Example: Switch-C circuit
  - Here an NMOS switch with $C=1\text{pF}$, $f_{\text{clk}}=10\text{MHz}$
- Set up PSS analysis for the $f_{\text{clk}}=10\text{MHz}$ clock
Includes sufficient number of **maxsideband** for accuracy.
Simulation shows $89\mu V$ of output RMS noise
- Ideal $\sqrt{(kT/C)}$ value = $64\mu V$,
- Simulation results close to the approximation of $\sqrt{(kT/C)}$
PNOISE Analysis

- Accuracy is tightened by using large number of *maxsideband* parameter
  - Determines how many sideband alias into the given band
  - Trades-off simulation time with accuracy
- For analytical details, refer to:
References

1. Spectre User Simulation Guide