

Reference: VCO_simulatoion_cadence.pdf

Pss-pnoise: To simulate phase noise.

1. Chose PSS from Analyses

Make settings as shown below.

The screenshot shows the 'Pss-pnoise' analysis settings dialog box. The 'Engine' is set to 'Shooting'. The 'Fundamental Tones' table has one entry: F1, 6G, 6G, Large. The 'Beat Frequency' is set to 6G. The 'Output harmonics' are set to 10. The 'Accuracy Defaults' are set to conservative. The 'Transient-Aided Options' are set to 'Run transient?' Yes, 'Detect Steady State' No, and 'Stop Time (tstab)' 120n. The 'Dynamic Parameter' is set to 'Oscillator'. The 'Oscillator node+' is set to /A and 'Oscillator node-' is set to /B. The 'Calculate initial conditions (ic) automatically' checkbox is checked. The 'Sweep' checkbox is disabled. The 'New Initial Value For Each Point (restart)' checkbox is disabled. The 'Loadpull' checkbox is disabled. The 'Enabled' checkbox is checked. The 'OK' button is highlighted.

oscillating frequency

#	Name	Expr	Value	Signal	SrcId
1	F1	6G	6G	Large	

Beat Frequency: 6G

Output harmonics: Number of harmonics: 10

Accuracy Defaults (errpreset): conservative

Transient-Aided Options: Run transient? Yes, Detect Steady State No, Stop Time (tstab) 120n

Dynamic Parameter: Oscillator

Oscillator node+: /A, Oscillator node-: /B

Calculate initial conditions (ic) automatically: checked

Sweep: disabled

New Initial Value For Each Point (restart): disabled

Loadpull: disabled

Enabled: checked

Buttons: OK, Cancel, Defaults, Apply, Help

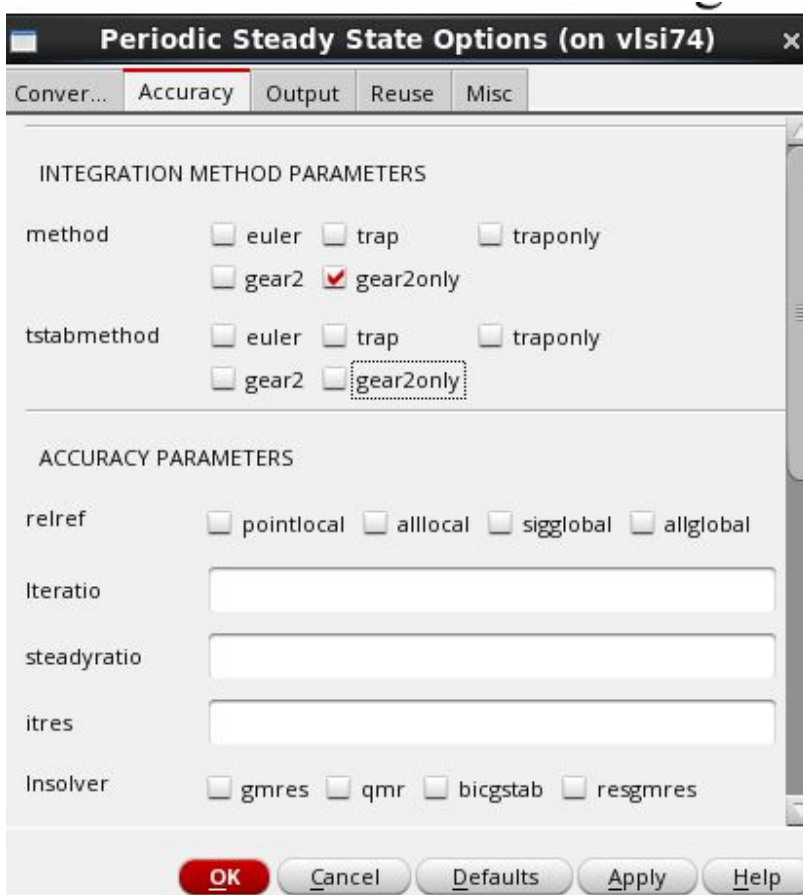
3. Make sure Sweep is disabled.

4. Make sure Enabled is selected.

5. Click on “options”



6. Select method “gear2only” then “Apply” and “OK”



7. Press “Apply” & “OK” in analyses window.

8. Now, setup pnoise analysis

The image displays two screenshots of the Pnoise analysis setup dialog. The left screenshot shows the 'Analysis' tab with 'pnoise' selected. The 'Periodic Noise Analysis' section is visible, showing 'PSS Beat Frequency (Hz)' set to 6G. The 'Multiple pnoise' checkbox is unchecked. The 'Sweptype' is set to 'relative' and 'Relative Harmonic' is set to 1. The 'Output Frequency Sweep Range (Hz)' is set to 'Start-Stop' with 'Start' at 100K and 'Stop' at 2M. The 'Sweep Type' is set to 'Logarithmic' with 'Points Per Decade' at 10. The 'Add Specific Points' checkbox is unchecked. The 'Sidebands' section shows 'Method' set to 'default' and 'Maximum sideband' set to 10. The right screenshot shows the 'Sidebands' and 'Output' sections. The 'Sidebands' section shows 'Method' set to 'default' and 'Maximum sideband' set to 10. The 'Output' section shows 'voltage' selected for 'Positive Output Node' and 'Negative Output Node'. The 'Noise Type' is set to 'timeaverage'. The 'Contribution Type' is set to 'ALL(AM,PM,USB,LSB)'. The 'Noise Separation' checkbox is unchecked. The 'Enabled' checkbox is checked. The 'Options...' button is visible.

Analysis

☐ tran ☐ dc ☐ ac ☐ noise

☐ xf ☐ sens ☐ dcmatch ☐ acmatch

☐ stb ☐ pz ☐ sp ☐ envlp

☐ pss ☐ pac ☐ pstb ☒ pnoise

☐ pxf ☐ psp ☐ qpss ☐ qpac

☐ qpnoise ☐ qpxf ☐ qpsp ☐ hb

☐ hbac ☐ hbstb ☐ hbnoise ☐ hbsp

☐ hbxf

Periodic Noise Analysis

PSS Beat Frequency (Hz) 6G

Multiple pnoise ☐

Sweptype relative Relative Harmonic 1

Output Frequency Sweep Range (Hz)

Start-Stop Start 100K Stop 2M

Sweep Type

Logarithmic ☐ Points Per Decade 10

☒ Number of Steps

Add Specific Points ☐

Sidebands

Method ☒ default ☐ fullspectrum

Maximum sideband 10

When using shooting engine, default value is 7.

Output

voltage Positive Output Node /A Select

Negative Output Node /B Select

Noise Type timeaverage

Timeaverage: single-sided spectrum and harmonic-referred (modulated) noise analysis

Contribution Type:

☐ USB ☐ AM ☐ PM ☐ AM&PM ☒ ALL(AM,PM,USB,LSB)

For fmjitter, PM noise must be enabled

Noise Separation ☐

Separate noise into source and gain

Enabled ☒

Options...

OK Cancel Defaults Apply Help

8. Press "Apply" & "OK"

9. Press "Netlist & Run" in ADE-L

10. After successful completion of the simulation, in ADE-L go to Results → Direct plot → main form

11. Select the options as follows

Direct Plot Form

Plotting Mode: Append

Analysis

☐ pss ☒ pnoise ☐ tstab

Noise Type

☐ USB ☐ LSB ☐ AM ☒ PM

Function

☐ Output Noise ☐ -20dB/dec Line
☐ Jc ☐ Jcc
☒ Phase Noise

Add To Outputs ☐ Plot

> Press plot button on this form...

OK Cancel Help

12. Plot the phase noise.

13. Highlight the phase noise at 1 Mhz with vertical cursor.