Simulation for THD of an output buffered op-amp

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Create a testbench as shown in Fig. 1, with the specified resistor values to have a closed loop gain of 1. Fig. 1 shows the setup for a differential op-amp; for a single-ended design, you will have only one set of resistor and a load, and will not need a balun at the output.

The differential input to the balun will be a vsin component from the analogLib library, with a frequency at 1/10th of the dominant pole for the op-amp, and an amplitude such that the output swings to VDD/4. Since the closed loop gain is 1, the input amplitude will be VDD/4, the same as the output swing.

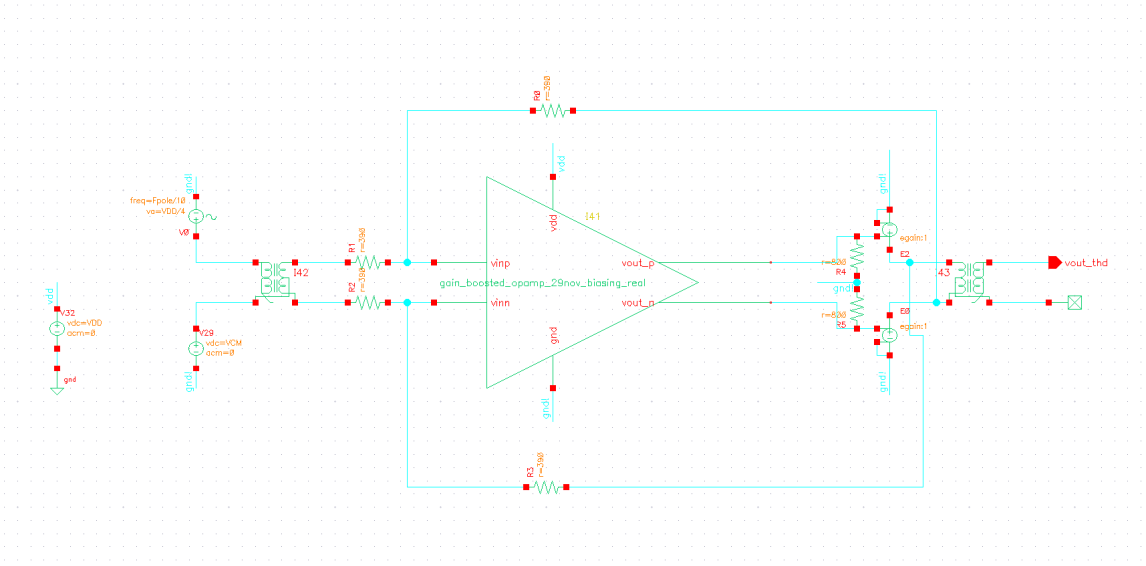

Fig. 1: Schematic for the testbench

Create a transient simulation, and run it for 10-15 cycles of the Fpole/10 frequency. Plot the output of the op-amp and buffer design. An ideal output is shown in Fig. 2.

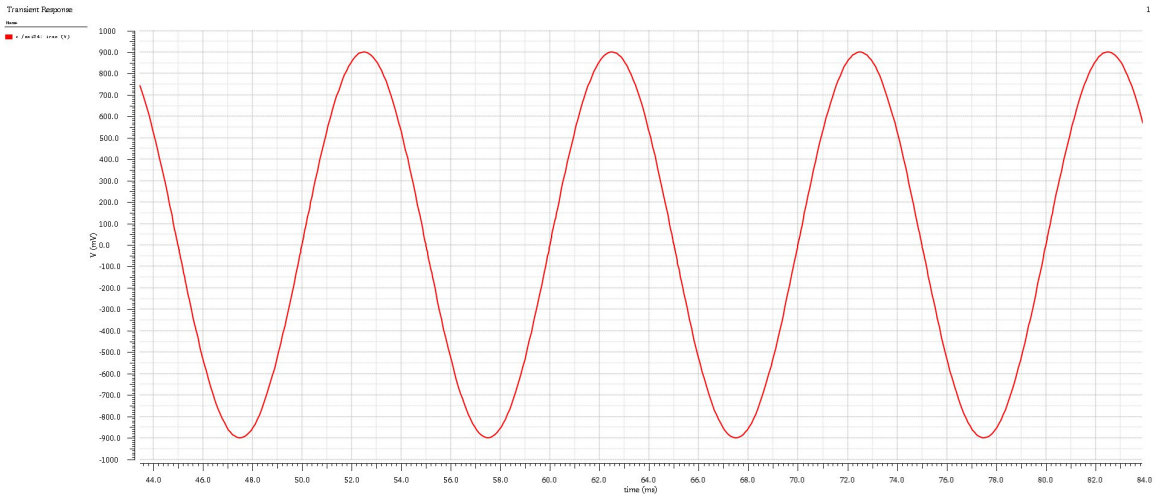

Fig. 2: Example plot showing the output waveform to be tested for THD

Take this waveform to the calculator (right-click on the net name in the plot, Send to>Calculator), and in the functions select the 'thd' function. This function 'computes the percentage of THD ofa signal with respect to the fundamental frequency and is expressed as a voltage percentage'.

Fill in the values as shown in Fig.3, and choose the From..To to be the beginning and the end of the 10th cycle of your waveform. Pick number of samples to be 2^n, and fill in the fundamental frequency (Fpole/10). If you need to learn more about this function, you can click on the 'Help' button on the bottom right. You can also send this function to ADE using the gear button, or plot it to get the value using the calculator/waveform button. This is the thd in percentage.

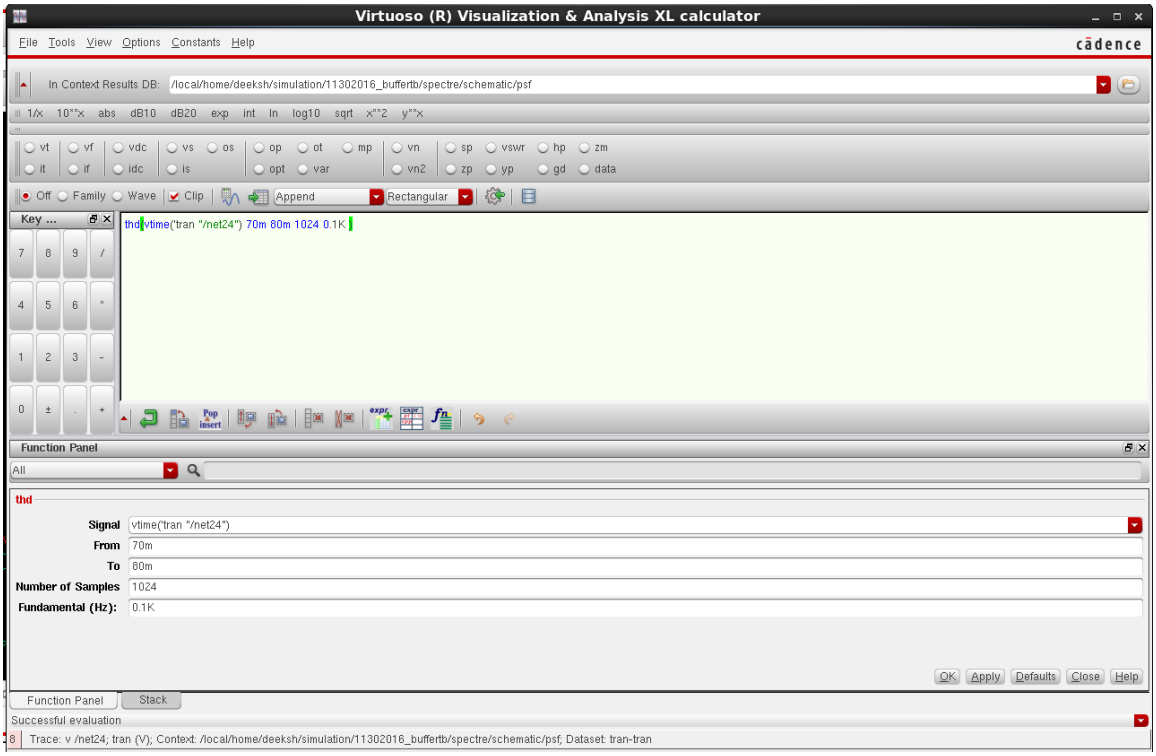

Fig. 3: Calculator showing the THD function