

Electrical Circuits II Lab 5 Online – Active Filters

Objectives

Designing and analyzing active filters using LTspice.

Preparation

Complete the following steps before starting to work on the experiments in this lab:

- 1) Complete Lab 4 and associated report.
- 2) Complete lecture, homework, and videos in FEC Chapter 13 “Active Filters”.
- 3) Op Amp AD8030 is used in all experiments in this lab. Data sheets is available at: <https://www.engr.cs.com/components/AD8030.pdf>
- 4) Use only capacitors with 1 uF value, set input to 1 v AC and keep filter gain at 1.

Experiment 1

Design an active low pass filter with cut off frequency at 2000 Hz. Implement the circuit in LTspice, chart the transfer function as bode plot in dB/decade and label cut off frequency (-3dB point).

Experiment 2

Design an active high pass filter with cut off frequency at 2000 Hz. Implement the circuit in LTspice, chart the transfer function as bode plot in dB/decade and label cut off frequency (-3dB point).

Experiment 3

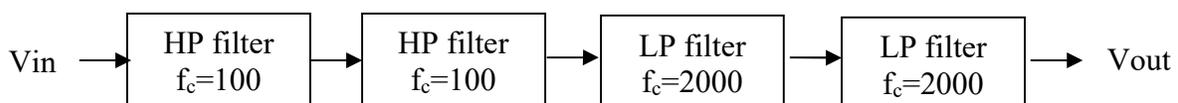
Design an active band pass filter with cut off frequencies at 100 and 2000 Hz. Implement the circuit in LTspice, chart the transfer function as bode plot in dB/decade and label cut off frequencies (-3dB point).

Experiment 4

Design an active band reject filter with cut off frequencies at 100 and 5000 Hz. Implement the circuit in LTspice, chart the transfer function as bode plot in dB/decade and label cut off frequencies (-3dB point).

Experiment 5

Modify experiment 3 design by using two low pass and two high pass filters instead of the one of each in series. Implement the circuit in LTspice, chart the transfer function as bode plot in dB/decade and label cut off frequencies (-3dB point). Compare and contrast the results in this experiment vs. experiment 3.



Report Requirements

This lab and associated report must be completed individually. All reports must be computer printed (Formulas and Diagrams may be hand drawn) and at minimum:

For each experiment include:

- Clear problem statement in your words.
- Answer to any specific experiment questions (if any)
- Identify the theory or process and associated calculations
- Documents resulting circuit schematics from LTspice, simulation output and additional tables, timing diagram or chart required by the experiment.

For the whole report include:

- A Cover page with your name, class, lab and completion date.
- A Lessons Learned section which summarizes your learning from this lab in 5 sentences or more.
- A New Experiment section that has description of a new experiment and the experiment's results. Experiment should be related to material covered in class but not simply variation of the existing lab experiments.