

The class met at 10 AM.

The purpose of the class was to gain actual experience designing crossover circuits, using a computer to do the nasty calculations. This sets the stage for them to design any crossovers we need for our project.

MATLAB crossover activity

The entire class time was spent in the MIT server cluster playing with MATLAB. I wrote scripts to simulate and combine R/L/C filters on speaker drivers using impedances. Maria gave each student a hardcopy tutorial that I wrote. The tutorial instructions covered:

- Setting up MATLAB
- Loading, viewing and interpreting FRD and ZMA data for speaker drivers
- Creating series and shunt circuit branches
- Finding transfer function and frequency response of those branches connected with the drivers.
- Complete crossover example with DC28 and RS150 drivers (IAP speaker design)

The tutorial then suggested a few ideas for new speaker designs that the students could try simulating. Apparently they spent around 1 hour getting started and one hour doing the tutorial.

Welcome back from spring break...

This class had two big ideas: to look at ideas for our project, and to finish the filter construction activity started in Week 2 by wiring a crossover for the DC28 and RS150 cabinet.

Project selection

- Goal: pick a type of system (2-way, 3-way, 2.1, etc) and figure out what you need to buy in order to build the project.

Crossover wiring

A while ago, the kids soldered together various filters: highpass, lowpass, bandpass using components from Edgerton and my stereo system. We tried listening to the DC28 and RS150 drivers directly, and then experimented with the different filters on each driver. At the end they fiddled with the connections to achieve a typical, parallel crossover network between the two drivers. It sounded reasonably similar to the completed IAP speaker!

Now all of my students were on spring break.

The goal of this class was to finalize our project idea and learn about enclosure design via Thiele/Small analysis.

Project selection (really)

- Right off the bat: decide to do stereo system with 10" subwoofer
- Choice: 2-way vs. extended range satellites (debate which is better)
- Morgan suggests full range satellite with small supertweeter
- Bingo, we have a winner: 10" sub + two satellites with 4" cone and cheap tweeter
- Final driver selection via e-mail by Wednesday

Driver parameters

- Review frequency response; focus is now on LF performance
- Mechanical: F_s , M_{ms} , V_{as} , Q_{ts}
- Electrical: R_e , L_e
- Motor strength (BL vs. x) and distortion
- Look at Tempest DUMAX sheet

Enclosure designs

- Equivalent circuits: compare compression of air in sealed box to series capacitance
- Sealed box frequency response
- Motivation for vented boxes; resonance
- Compare FR and cone excursion for sealed vs. vented
- Predict distortion behavior
- Little bit on dipoles and transmission lines (El Pipe-O)

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