

**Lab 2:** Interference effect. In this lab you will use the phase-dependent effect of combining two sinusoids to change their amplitude dependent on frequency.

To start with, make a single sinusoid of frequency 100 Hz (using the sinusoid object in the acoustics library). You can check the level of its output using the “meter” object; it should be about 97 dB.

Now put the sinusoid into a “vdelay” (variable delay) object, and connect the delay output as well as the original sinusoid output to the meter. When the delay is zero you should see something 6 decibels higher, about 103.

Now measure and graph the amplitudes you measure, changing the delay in ten steps from 0 to 0.005 seconds. (Hint: to make the graph readable, don’t make the vertical axis linear in decibels; instead, perhaps make equal spaces for 0, 94, 97, 100, and 103). But if you really want a nice-looking graph and don’t mind 5 extra minutes of effort, graph the signal power (the square of the RMS amplitude).

Now do the same thing (on the same graph with a different color or line style) with the sinusoid at 200 Hz. instead of 100 Hz. Do you see a relationship between the two?

Now put six sinusoids at 100, 200, 300, 400, 500, 600 Hz. into a “switch” object (that’s primarily for convenience; connecting the six to the switch will add them.) Connect the switch output to both the delay and directly to the output as before. As you change the delay between 0 and 10 milliseconds (0.01 second), what do you hear? What special thing happens when you choose a 5 millisecond (0.005 second) delay?

Adding a sound with a delayed copy of itself produces the simplest type of digital filter, called a *comb filter*.