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 (in 10 steps, as before) 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*.