Composition: Electronic Media I
Fall 2004
Spectral Analysis in Kyma

1. Background
   a. Jean-Baptiste Fourier

   b. *On the Propagation of Heat in Solid Bodies* (1807)
   c. Any periodic wave can be represented as a sum of sine waves whose frequencies are integral multiples, and whose amplitudes and phases are properly adjusted.

2. Fourier series for middle C, where f = 261.65 Hz

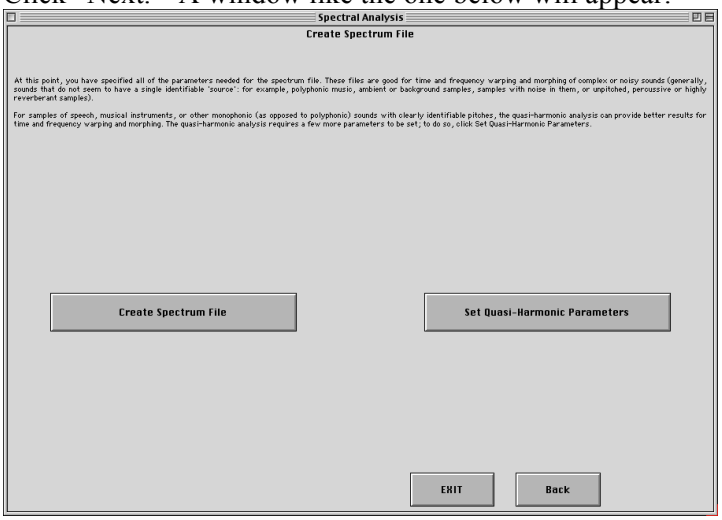
12f	3139.80 Hz	
11f	2878.15 Hz	
10f	2616.50 Hz	
9f	2354.85 Hz	
8f	2093.20 Hz	
7f	1831.55 Hz	
6f	1569.90 Hz	
5f	1308.25 Hz	
4f	1046.60 Hz	
3f	784.95 Hz	
2f	523.30 Hz	
1f	261.65 Hz	C4

3. Prepare soundfiles for spectral analysis in **Kyma**
   a. Use to **Peak** to isolate individual sounds—create a new mono soundfile for each sound and normalize it.
   b. Single-pitches work better than complex sounds. A good resource is the Iowa Musical Instrument Samples Database.

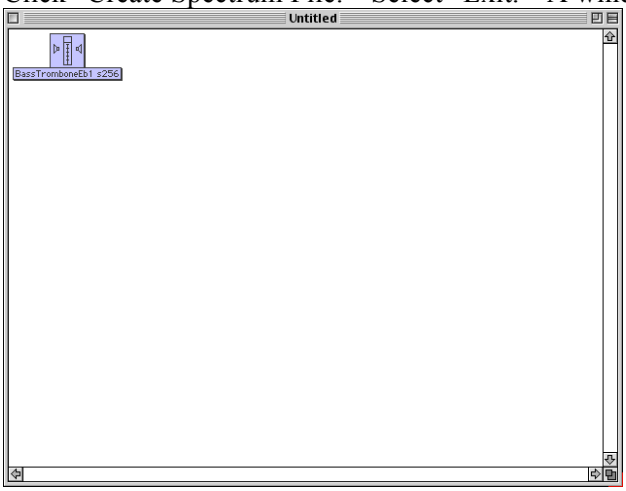
4. Perform the spectral analysis of your soundfile as follows:
   a. Launch **Kyma**.
   b. Select **Tools>Spectral Analysis**. A window like the one below will appear:

c. Click “Select” to find a soundfile you wish to analyze, then click “next.” A window like the one below will appear:

d. Click “Audition” to hear the spectral analysis. By ear, select the best settings in the upper right corner. Click “Next.” A window like the one below will appear:

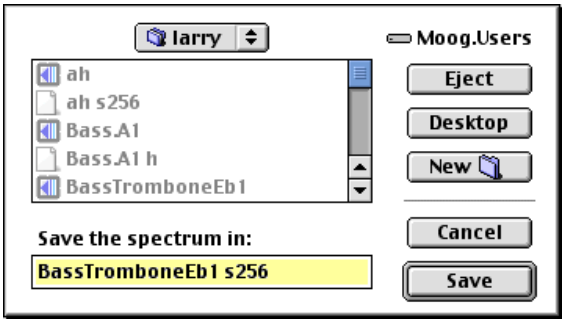


e. Click “Create Spectrum File.” Select “Exit.” A window like the one below will appear:

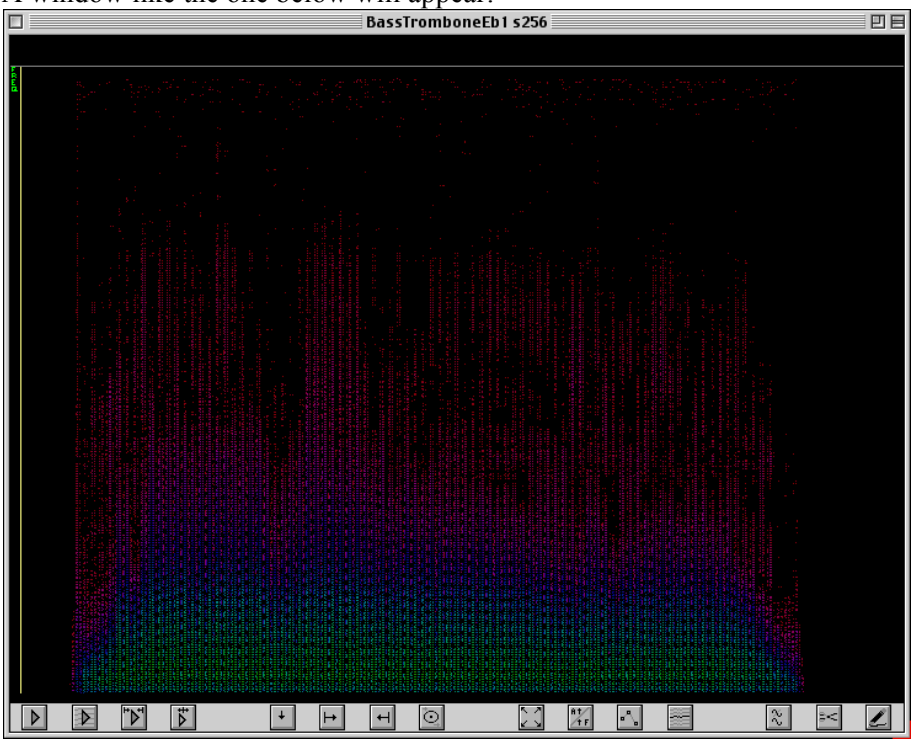


f. Ignore this window for now. Uncompile the sound with command K.

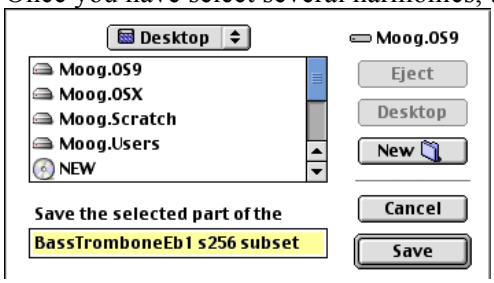
5. Save the spectrum as the one below:



6. Open the **Spectrum Editor** as follows.
   a. Select **Open>Spectrum File**. Use the dialog window to find the spectrum file that you just created.
   b. A window like the one below will appear:



   c. The **spectral editor**, shown above lets you select:
      i. Single harmonics by clicking one each track.
      ii. Multiple harmonics by shift-clicking on other harmonics you wish to add.
      iii. Bands of harmonics by drawing a box around the the band of harmonics you wish to select.
      iv. Once you have select several harmonics, then select **Save.** A window like the one below will appear:



      v. Notice that the word "subset" has been appended to the end of file name (you will also see "subset 2," subset 3," etc. when you save other changes.

7. Next, the **Sum of Sines** module.