

Harmonic visualizer


Quick example

What is this document about?

This document is an example tutorial that goes through some basic operations of harmonic visualizer (HV), using a vocal vibrato sample from the RWC musical instrument database. For a more comprehensive introduction of HV please see accompanying document QuickStart1107.pdf.

To use this tutorial, make sure the follow files

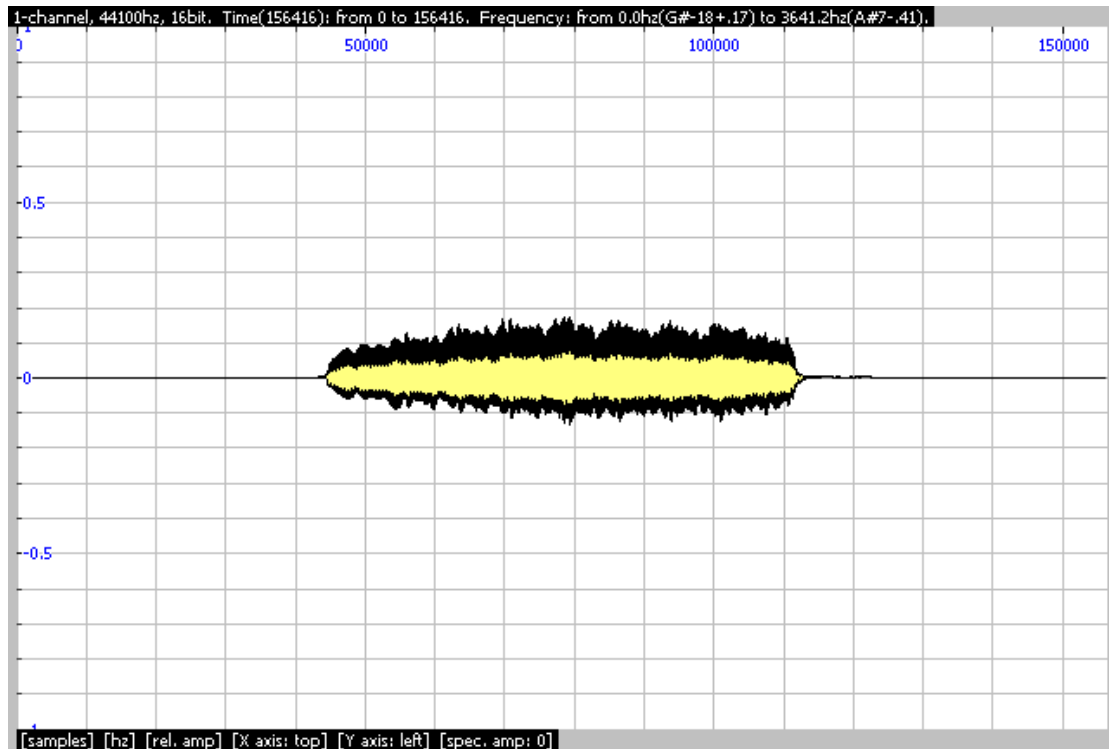
hv.exe	Win32 executable
hv.ini	settings file
51spfvf-1.wav	example audio

are located in the same folder over which the user has read and write access. To start, double-click the executable file icon ().

Loading the audio file

1. Upon start the example audio file is automatically loaded into the main window. This is specified by the following lines in hv.ini:

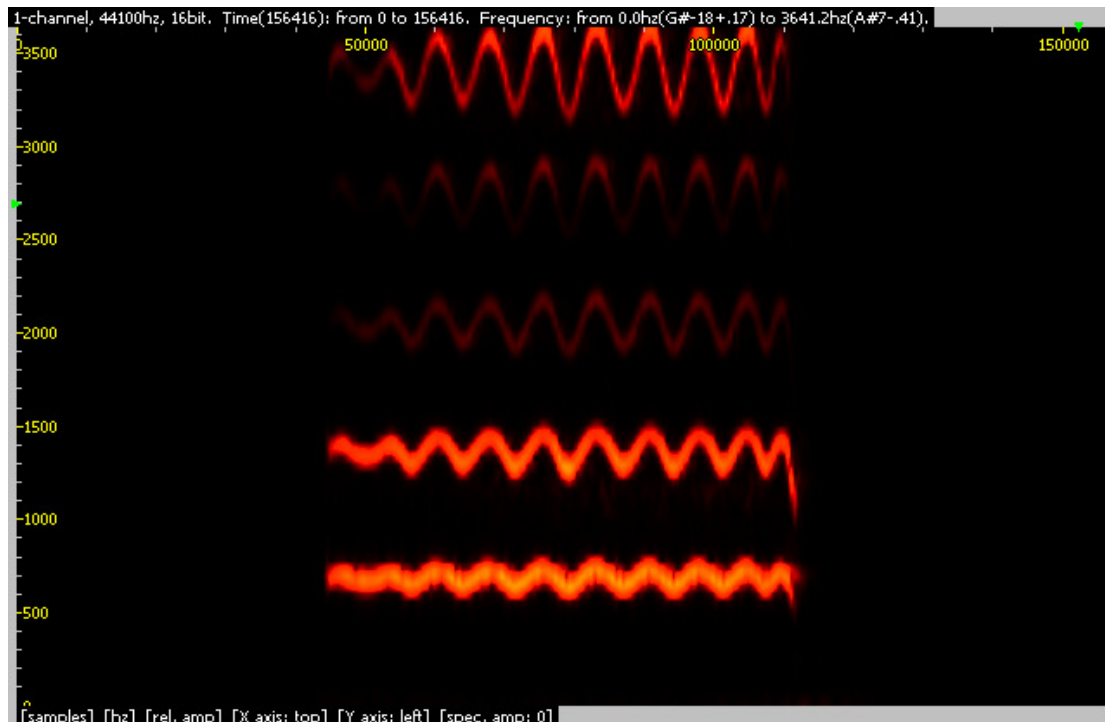
```
[CurrentFile]  
FileName=451spfvf-1.wav
```



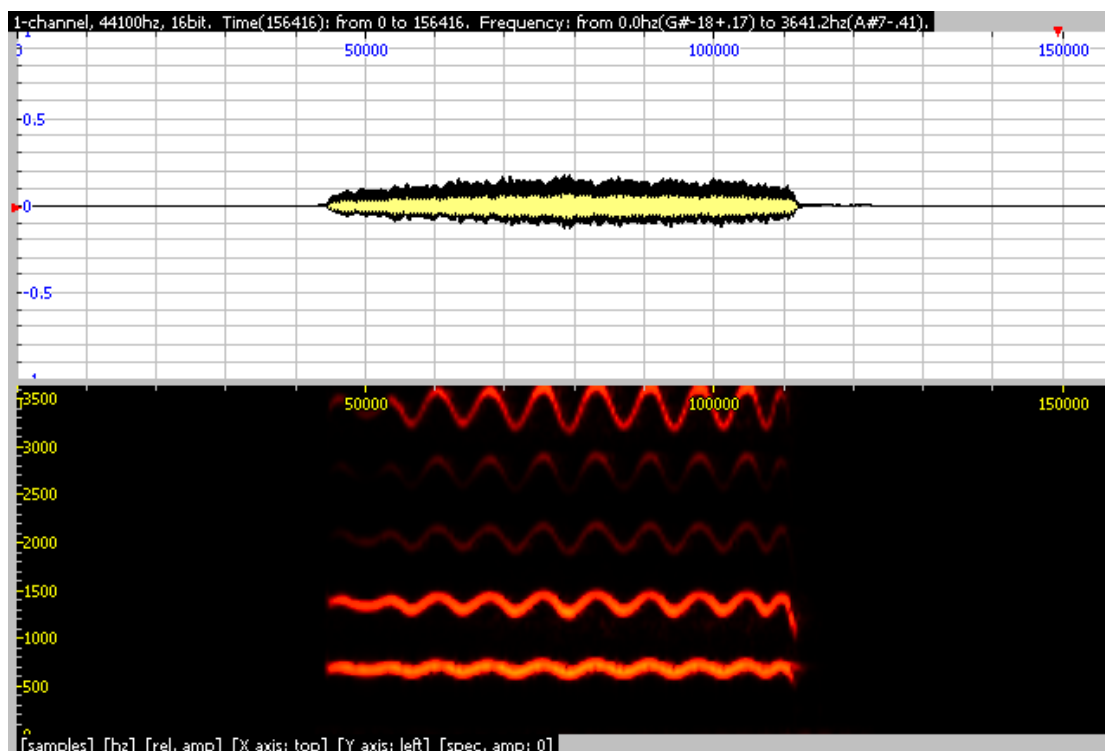
2. The main display area includes a waveform/spectrogram display and two rows of tags, one above and one below the waveform/spectrogram display area.

Spectrogram

1. Click the Waveform/Spectrogram button () to see the spectrogram. Click again to come back to waveform view.



2. On the Display page of the settings panel (the right part of the main window), click “double” in Panes box to display both waveform and spectrogram. Click “single” to get back to waveform view.

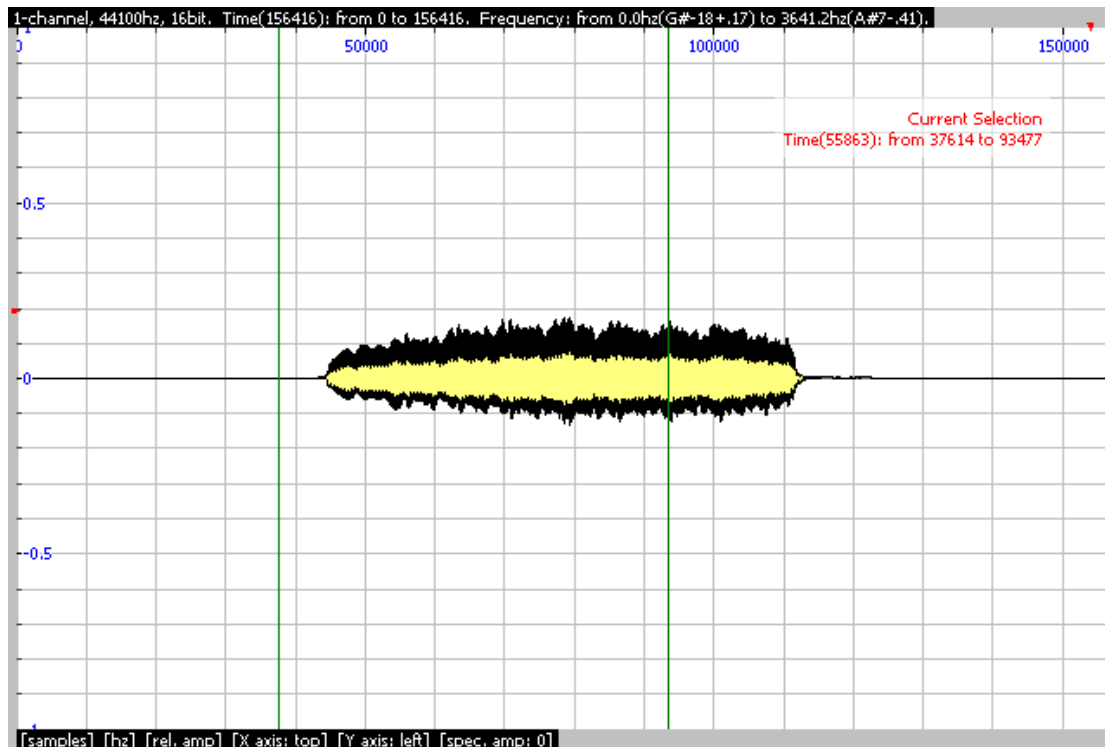


3. Use the drop boxes on the toolbar to select the type and size of the window function used for calculating spectrogram.

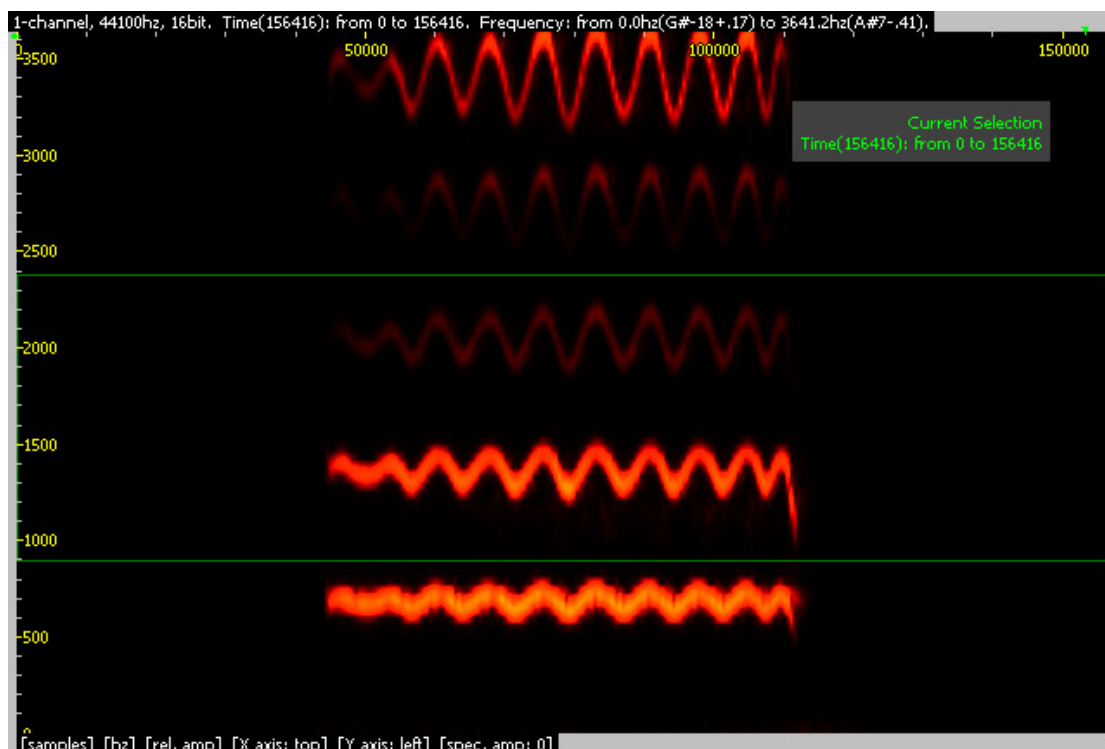
4. Roll the mouse wheel at the spec.amp tag (rightmost of the row of tags at the bottom) to change the brightness (display amplification) of the spectrogram.

Simple time-frequency selection

1. Hold down the left mouse key and drag in the waveform display area to make a simple selection of a time interval.



2. Switch to spectrogram view. Click the Frequency Selection button "F" on the tool bar. Drag in the spectrogram display area to make a simple selection of a frequency band.



3. Hold down the Ctrl key and drag any border (green line) or corner to adjust the selection.
4. Click to cancel this selection.

Navigation

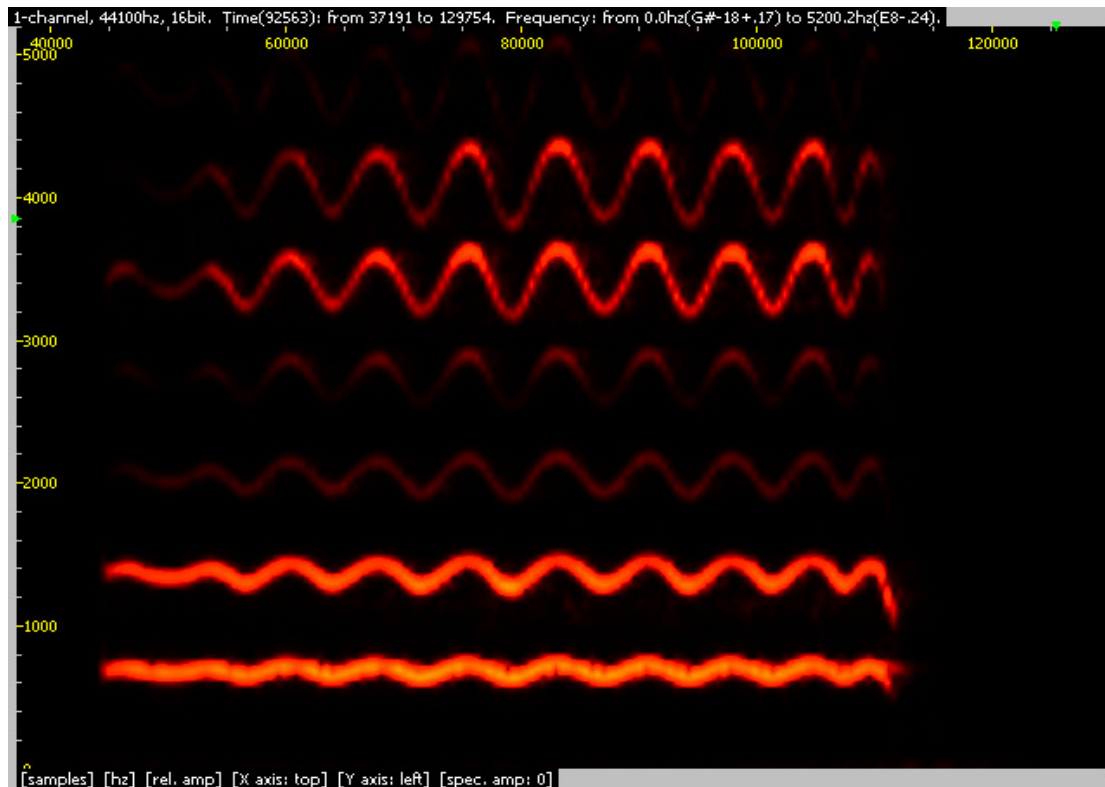
1. Roll mouse wheel up to zoom out in time, down to zoom in. The mouse pointer locates the zooming centre.
2. Switch to spectrogram display. Hold down any mouse key and roll mouse wheel up to zoom out in frequency, down to zoom in. The mouse pointer locates the zoom centre.
3. Make a simple time-frequency selection. Right-click in the spectrogram display area, select “Zoom to selection” from the popup menu to zoom to the selected part.
4. Hold down the right mouse key and drag mouse to reposition the time and frequency range being displayed. This does not change the displayed duration or bandwidth.
5. Use Restore|Time zoom or Restore|Frequency zoom from popup menu to zoom to the whole time or frequency range of the audio file.

Playback

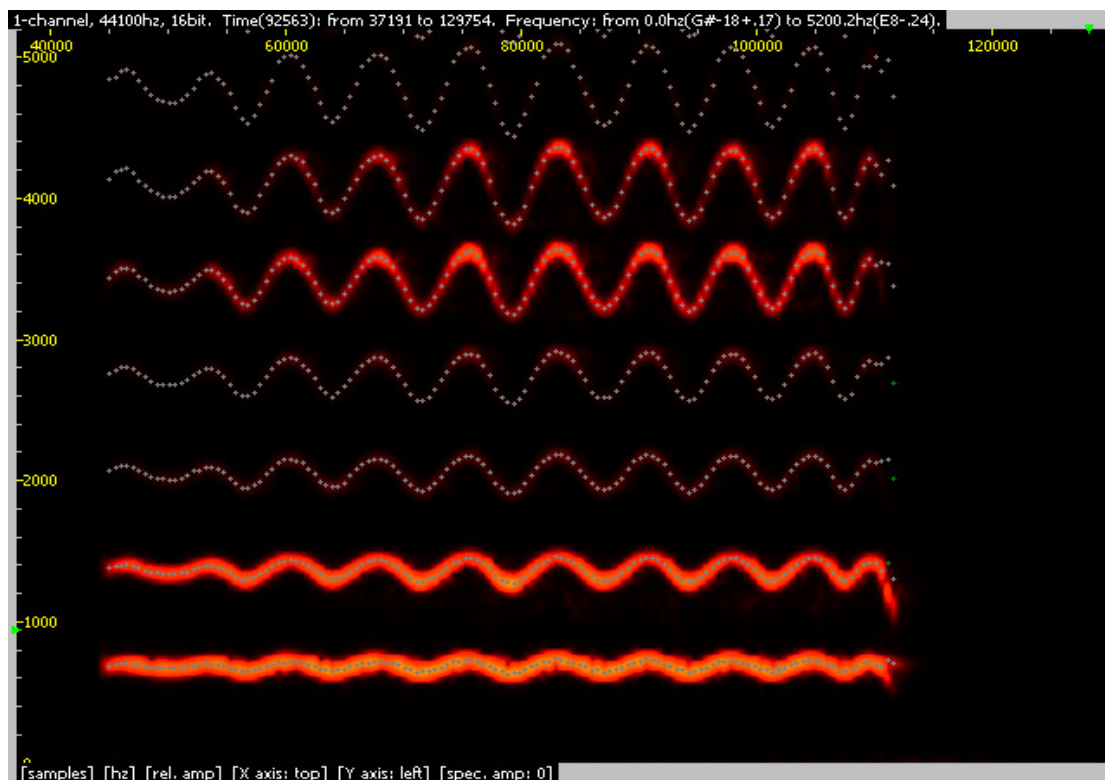
1. Right-click in the spectrogram display area and select Play from the popup menu to play audio.
2. Select a time interval, right-click *inside* the selection and select Play from the popup menu. This plays only the selected duration of audio.

Selecting event as harmonic sinusoid

1. Switch to spectrogram display, make sure the window size is 1024. Change the display range so that it looks like below.

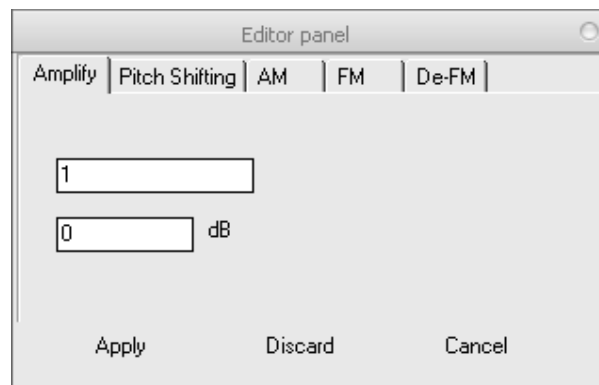


2. Press down the harmonic selection button (≡) on the tool bar. Click on the fundamental partial in the spectrogram display. The vocal event is now selected as a harmonic sinusoid, with each sinusoid atom marked by a small cross. At the same time an EventBox window is displayed to the right of the main window.



Working with harmonic sinusoid

1. Move mouse pointer over any atom of the harmonic sinusoid so that the latter is highlighted.
2. Right click on the atom and select Extract from popup menu to reconstruct the harmonic sinusoid.
3. Press F2 to bring back the original audio.
4. This time select Cut from popup menu to subtract the reconstructed harmonic sinusoid from original audio.
5. Press F2 to bring back the original audio.
6. Select Editor panel...|Amplify from popup menu to bring up the editor panel. Five types of modifications (7~11) are available using this panel.

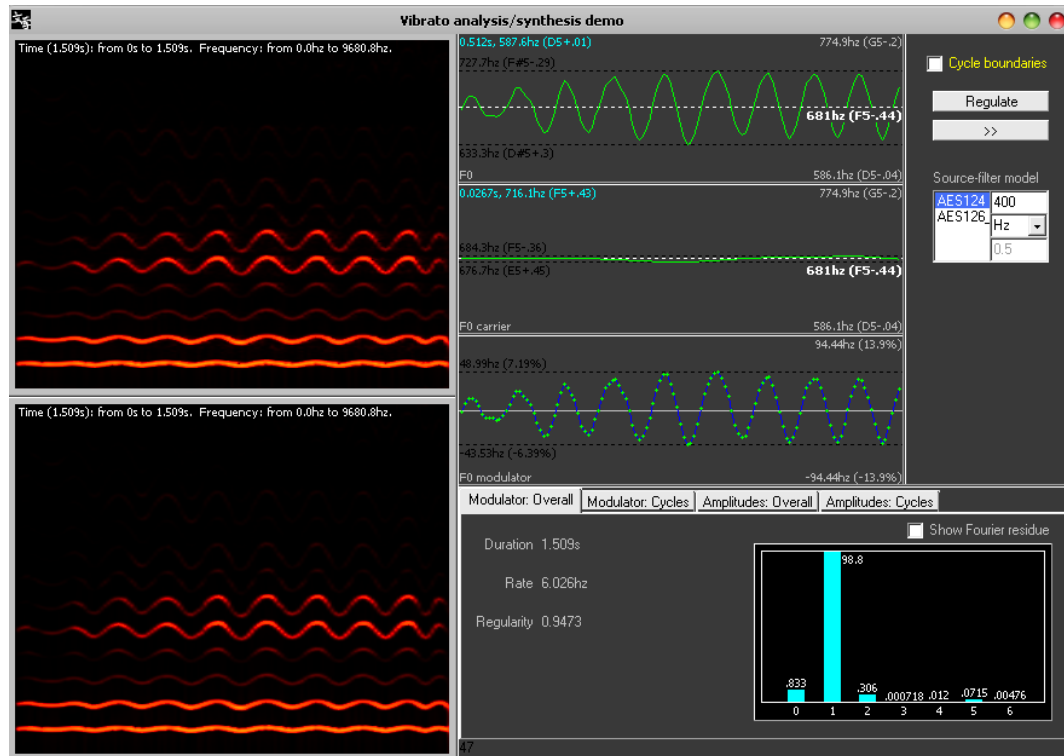


7. On Amplify page roll the mouse wheel up or down inside either edit control to amplify the selected harmonic sinusoid. You can play the sound without closing the Editor panel.
8. On the Pitch Shifting page, roll the mouse wheel up or down inside the edit control to shift the pitch of the selected harmonic sinusoid.
9. On the AM page, roll the mouse wheel up or down inside the edit controls to impose amplitude modulation.
10. On the FM page, roll the mouse wheel up or down inside the edit controls to impose frequency modulation.
11. On the De-FM change, roll the mouse wheel up or down inside the edit controls to change the amount and rate of already-existing frequency modulation.
12. Click OK to close panel and apply changes, CANCEL to close panel and discard changes.

p.s. You can always bring back the original audio by pressing F2, event after applying changes. However, you'll need to redo the harmonic sinusoid selection step. Since the selection step cannot start on a highlighted event, you need to deselect the current event by clicking on any white space in the Events window.

Working with vibratos

1. Click the selected harmonic sinusoid in the EventBox window and select Vibrato... from the popup menu. This brings up the Vibrato demo window.



The vibrato demo contains two spectrogram views. The upper one is the original audio, the lower one is the resynthesized harmonic sinusoid. In the central part are three plots: (from top to bottom) F0, F0 carrier and F0 modulator. Below these plots is a 4-page panel showing some detailed attributes of the vibrato being analyzed.

1. Move the mouse pointer horizontally over the F0 modulator plot to see how the attributes vary from cycle to cycle.
2. Roll the mouse wheel inside the F0 carrier plot to shift global pitch.

p.s. You can listen to the modified sound by selecting Play from the popup menu of the lower spectrogram display. At any time the original unaltered harmonic sinusoid can be restored by double-clicking the event in the Events window.
3. Roll the mouse wheel inside the F0 modulator plot to change the modulation extent locally when one cycle is highlighted, or globally when no cycle is highlighted.
4. On the Modulator:Overall panel page, roll the mouse wheel at the duration value to do time-stretching without changing modulation rate, or at the rate value to change the modulation rate without time stretching.
5. Repeat 4 on the Modulator Cycle panel page to apply these changes locally.
6. On the Amplitude:Overall panel page, drag one coloured bar in the left box or one coloured dot set in the right box to change the amplitude a single partial.
7. Repeat 6 on the Amplitude Cycle panel page to apply these changes locally.

(End of tutorial.)