

Using Madde

Madde works using additive synthesis, so that the output signal is made by summing up sinusoids of harmonic ratio frequencies, each one having its own amplitude. In a similar system, there are no filters (strictly speaking) because spectral shapes (formants included) can be easily obtained modifying in a suitable way the amplitude of each sinusoid.

A glance to the Madde main Window.

In the upper left corner you can find the "Formants" pane.

Formants					
<input checked="" type="checkbox"/> F1[Hz]	<input checked="" type="checkbox"/> F2[Hz]	<input checked="" type="checkbox"/> F3[Hz]	<input checked="" type="checkbox"/> F4[Hz]	<input checked="" type="checkbox"/> F5[Hz]	<input type="checkbox"/> F6[Hz]
800	1200	2500	2700	2900	
800Hz	1200Hz	2500Hz	2700Hz	2900Hz	
Factor:	1	Apply!			
Q1	Q2	Q3	Q4	Q5	
10	10	10	10	10	
80.0Hz	120.0Hz	250.0Hz	270.0Hz	290.0Hz	

If you "switch off" every formant (unchecking the corresponding checkbox) you can hear (and see in RTsect) the simulated glottal signal: a sawtooth).

Beneath every formant you can read / modify its frequency. You can move frequencies, all together by a common factor, writing up this figure into the "Factor" entry. If you write here 1.3, you will raise every frequency by 30%, If you write 0.8, you will pull down every frequency by 20%.

Attention, please: you must make use of the comma (",") or the dot (".") as a decimal separator, as a function of what you have declared as your locale in Windows. Try to fix it.

You can find below the entries for the Qs. These are "merit factors" of the "formant filters" (so speaking, in additive synthesis you don't need actual filters). Higher values mean more selectivity, lower Q values mean less selectivity. If you pull down these values, you can hear the "formant effect" becoming less and less prominent, till it disappear.

You can find the bandwidth beneath the entries, and you can observe how they change when moving Q. A bandwidth of, to say, 80.0 Hz at 800 Hz of peak value means that @ 800-80 Hz and @ 800+80 Hz the gain of the filter is 3 dB beneath the peak value.

This Q (or bandwidth) have a physical meaning, which will become clear when studying the dissipative 2nd order systems (or dissipative oscillators, either mechanic or electric). This factor is tied to the dissipation in the system (friction, conversion from mechanical/electrical energy to heat).

The F0 pane, left lower corner:

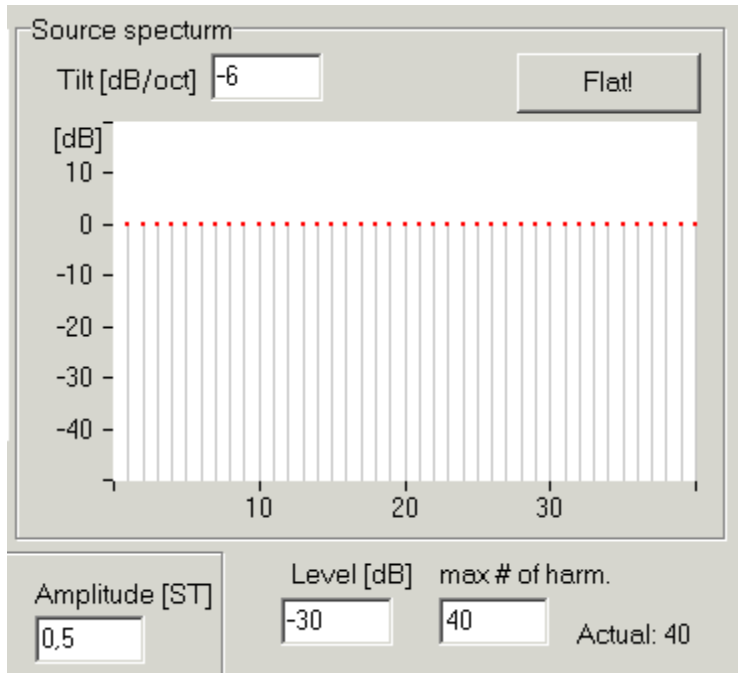
F0		Flutter		Vibrato	
Pitch [ST]	60	Filter f0	6	Freq [Hz]	6.5
	261,6 Hz, C4	Filter Q	5	Amplitude [ST]	0.5
Smoothing f0	5	Amplitude [%]	1		
Smoothing Q	1				

F0 (or f0) stay for the pitch (or fundamental frequency, in this case), namely is a note (whose name you can find at the right of the frequency, in this case C4).

Madde makes use of many of the known features of the simulated singing voice (see the works of Chowning, Sundberg and Rodet on this subject). So the glottal signal is submitted to a random frequency modulation (Flutter) plus a periodical (sinusoidal) frequency modulation (Vibrato). You can set the parameters for these modulations: Amplitude and frequency. This last one has a different meaning for flutter

and vibrato. The flutter is a noise filtered around a frequency (you can thus set this frequency, and the Q of the filter). The Vibrato is a sinusoid, so that the frequency is shortly its frequency. The amplitude (for both) is actually a Modulation Index (FM).

Then the partials (harmonic) pane:

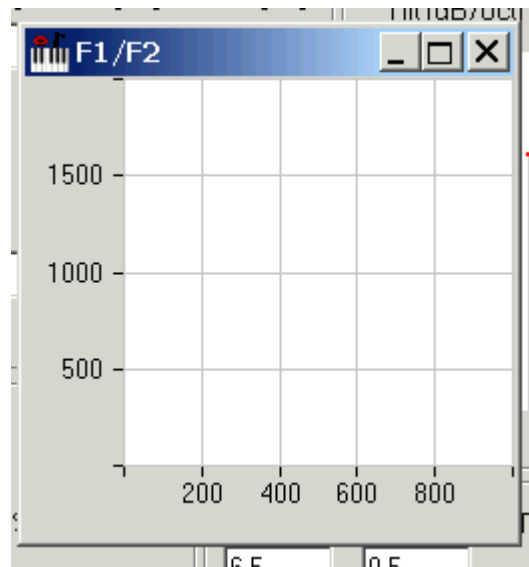


Here you can find the slope of the amplitudes as a function of the frequency. -6 dB/octave is exactly the slope which will produce a sawtooth. If you modify the slope, you can reset the original value by pressing Flat!.

In the windows below, you can further modify (or shape) the formants, relatively to the chosen slope. Every red dot can be moved individually, but you can also draw the shape by moving the click-mouse.

You can also modify the power of the signal (Level in dB), and the number of partials (by default 40, which is quite enough for the purpose)

Now, a very interesting window (menu "Settings", submenu "Show F1/F2 map"):



If you draw using the mouse on the window, you can modify both F1 and F2, thus modifying the pronounced vowel.

