Signals, systems, acoustics and the ear

Week 6

Interpreting a cochlear simulation
Today’s lab: A cochlear simulation
A computer implementation of this model
Flip it around
A cochlear simulation

How should we look at the output of the model?
Could look at the output waveforms
But hard to see what is going on (especially for complex waves)
Solution: encode wave amplitude in a different way

waveform at 200 Hz

rectified & smoothed

spectrographic

waveform amplitude is recorded as the darkness of the trace
Encode wave amplitude as trace darkness

waveform at 1 kHz
rectified & smoothed
spectrographic
Encode wave amplitude as trace darkness

- waveform at 4 kHz
- rectified & smoothed
- spectrographic
Construct the output display one strip at a time

input signal at 200 Hz

output display
Construct the output display one strip at a time

input signal at 4 kHz

output display
$4 \text{ kHz } + 200 \text{ Hz}$
4 kHz + 200 Hz
Auditory and ordinary spectrograms