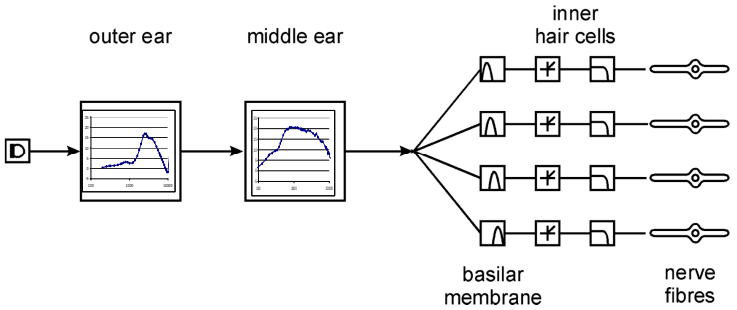
Signals & Systems for Speech & Hearing

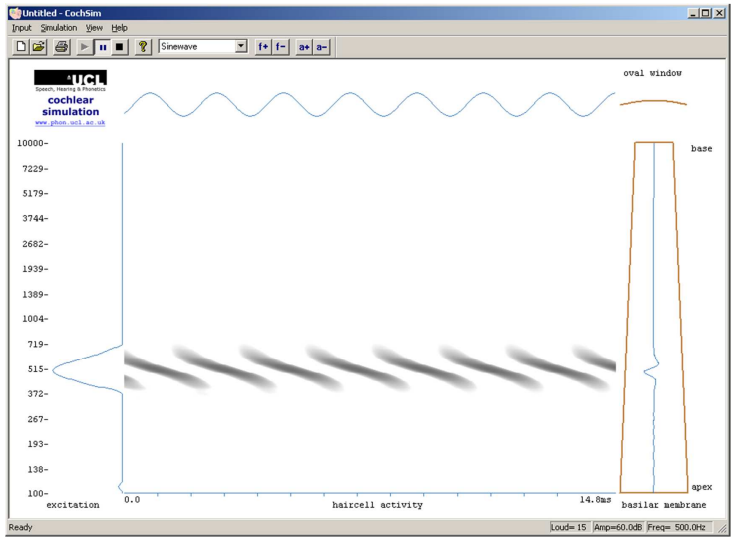
Week 7

Interpreting a cochlear simulation

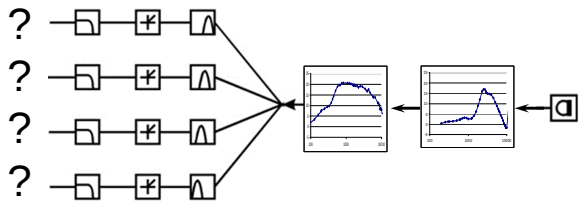
Today's lab: A computer implementation of essentially this model



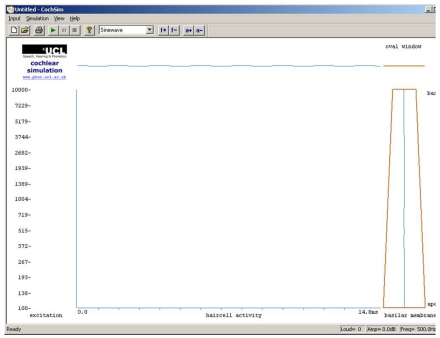
A cochlear simulation

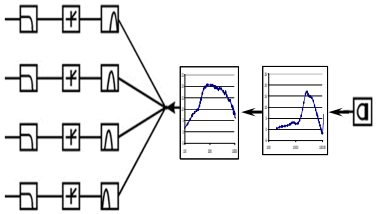


Flip it around



A cochlear simulation

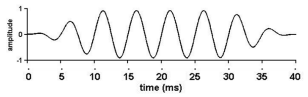




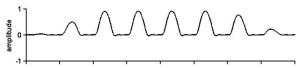
How should we look at the output of the model?

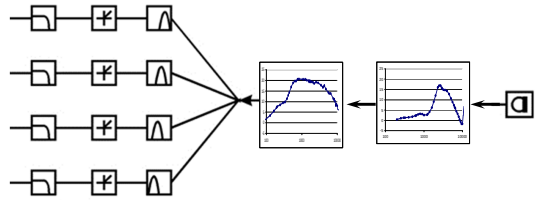
Could look at the output waveforms

input signal

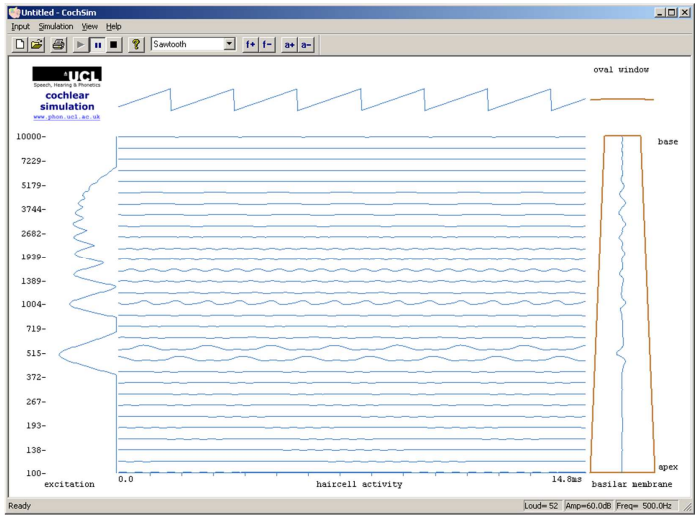


output signal

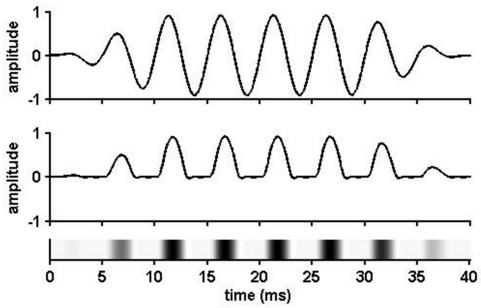




But hard to see what is going on (especially for complex waves)



Solution: encode wave amplitude in a different way



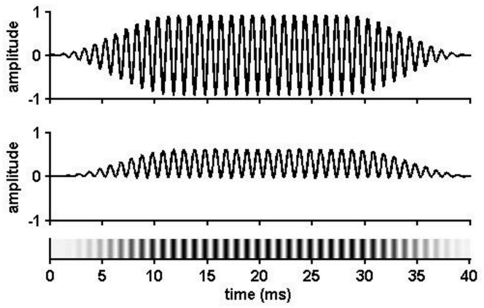
waveform at 200 Hz

rectified & smoothed

spectrographic

waveform amplitude is recoded as the darkness of the trace

Encode wave amplitude as trace darkness

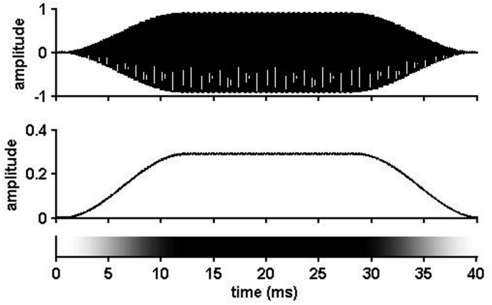


waveform at 1 kHz

rectified & smoothed

spectrographic

Encode wave amplitude as trace darkness



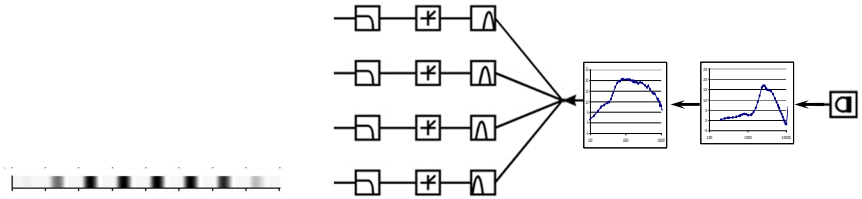
waveform at 4 kHz

rectified & smoothed

spectrographic

Construct the output display one strip at a time

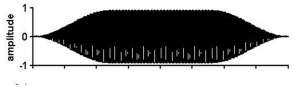
input signal at 200 Hz

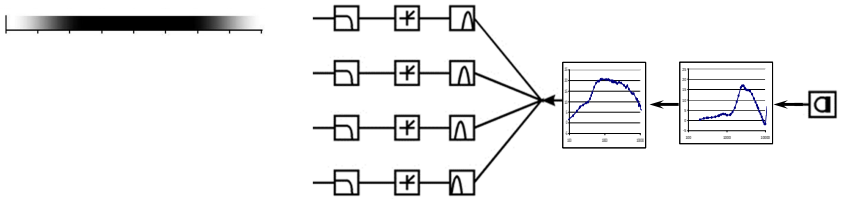


output display

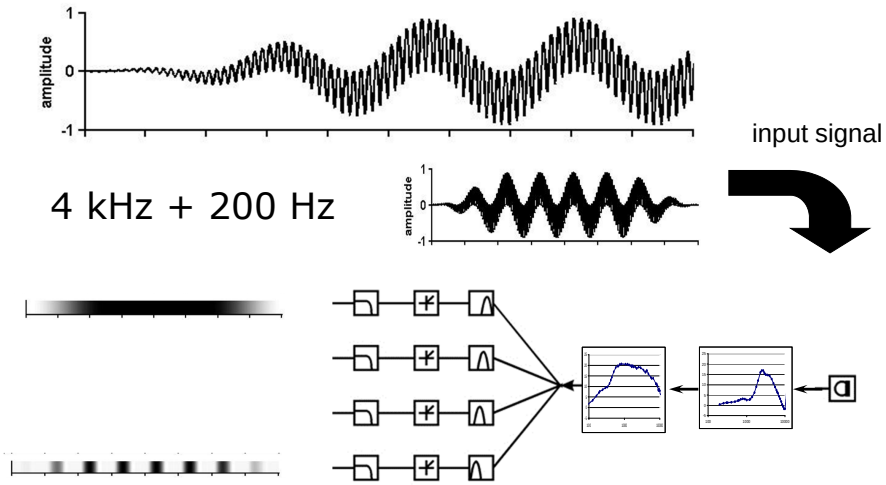
Construct the output display one strip at a time

input signal at 4 kHz

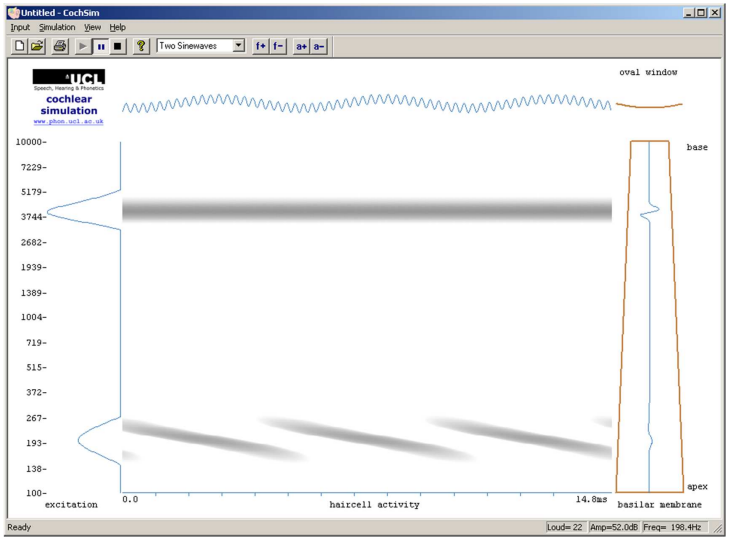




output display



4 kHz + 200 Hz



Auditory and ordinary spectrograms