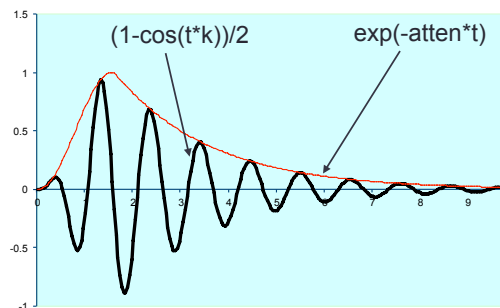


OTHER VOICE SYNTHESIS TECHNIQUES

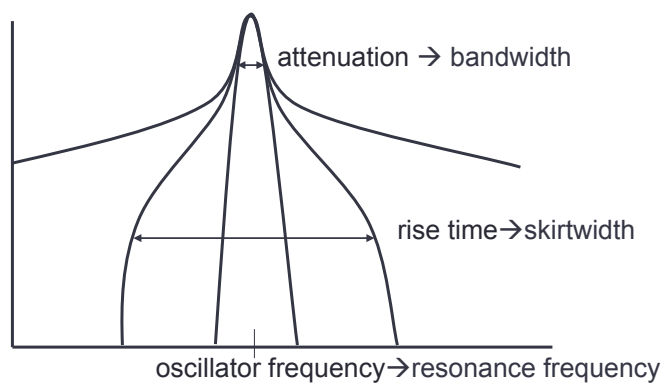
FOF, Vocoder, MQ, SMS

FOF

- FOF is a French acronym “Formant Wave-Function” (Synthesis)
- FOF simulates the effect of a glottal pulse exciting a single formant resonance
- Related to VOSIM



FOF in the Frequency Domain



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FOF Analysis

- FOF parameters can be obtained automatically by modeling the peaks of an STFT
- Not limited to voice synthesis

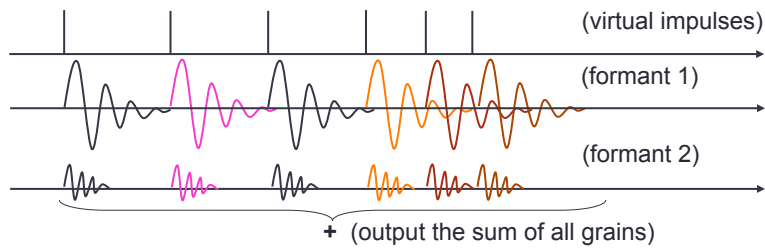
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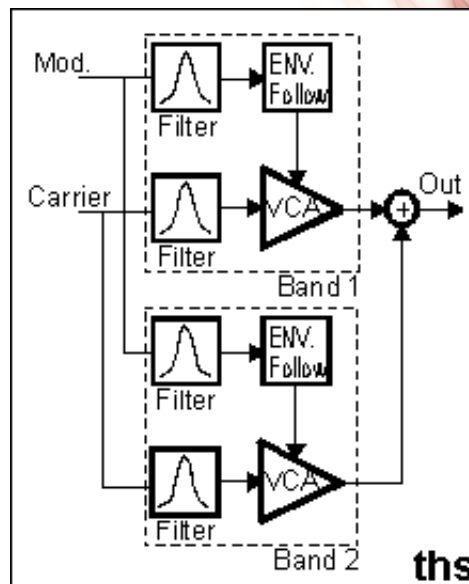
FOF Synthesis

- Each FOF generator creates the response of a single formant to a single impulse -- essentially a grain.
- FOF generators are allocated dynamically (since response to one impulse can overlap in time with response to the next impulse)



Example: Jean-Baptiste Barriere, *Chreode I*,
<https://www.youtube.com/watch?v=5AEFhybYrPg#t=128>

Vocoder



From: <http://www.ths-nation.de/recall/vocoder.htm>

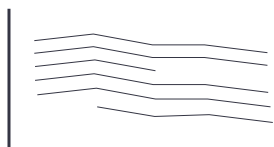
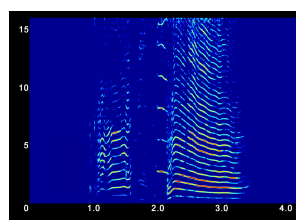
Phase Vocoder

- Intended mainly for sounds with few partials
- Assume each partial lands in a separate Discrete FT bin/channel/frequency
- From successive frames of FFT, estimate amplitude and phase of partial
- Reconstruct using inverse FFT

 Original
  Stretched
  Lower

MacAulay-Quatieri (MQ) Synthesis

- Developed as a speech compression technique
- Identify and track sinusoids in STFT frames
- Representation is list of trajectories of sinusoidal partials
- Additive synthesis

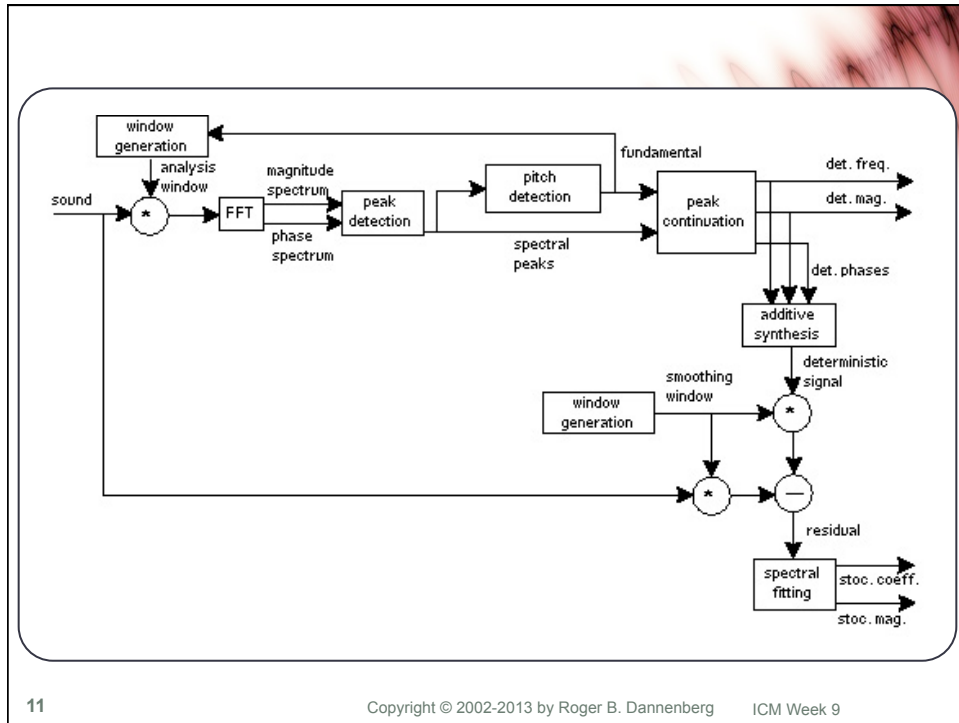


MQ Analysis/Synthesis

- Because of the spectral representation, time stretching and frequency shifting are easy
- Sinusoid track representation allows phase continuity – no “buzz” at frame rate
- Noise is handled by using large numbers of sinusoids – not very efficient or flexible
- Resonances not modeled
- No obvious cross-synthesis method (interpolation?)

SMS – Spectral Modeling Synthesis

- Xavier Serra’s thesis work, continued at Music Technology Group, Audiovisual Institute, Pompeu Fabra University, Barcelona
- Extends MQ Analysis/Synthesis with explicit model for noise


















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SMS Examples

-  Original
-  Deterministic
-  Stochastic
-  Synthesis
-  1
-  2
-  3
-  4
-  5
-  6
-  7
-  8
-  9
-  10
-  11

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