ACOUSTICS2008/832
Intelligibility of temporal fine structure speech signals with restricted FM excursion

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The Hilbert transform is the most common demodulation technique to derive temporal fine structure (TFS) signals. However, for speech stimuli, the Hilbert transform generally leads to results that have no clear physical meaning, generating undesired artefacts; for instance, instantaneous frequency may vary well beyond the analysis filters bandwidth. This study examined the intelligibility in quiet of TFS-coded Vowel-Consonants-Vowel signals generated with a demodulation technique minimizing these artefacts. Speech items were passed through a 16 FIR filters (750th order) filterbank. A Greenwood mapping was used to set filters bandwidth between 80-8020 Hz (approximately 2 ERBs wide). A frequency-modulation function was extracted at the output of each filter, hard limited within the analysis bandwidth and lowpass filtered. Spectral cues were removed by equating the rms across bands. Identification scores ranged between chance level (6.25%) with no improvement across sessions for the least experienced listeners and 50% correct for the most experienced listeners. Further experiments will investigate these between-listeners differences.