

# innovations

from The University of Vermont

**TITLE:** DISCRETE-TIME ANALYTIC SIGNAL GENERATION SYSTEM

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**DESCRIPTION:** Hilbert transformers have many applications in signal processing. A common type of efficient communication scheme is Single-Side Band (SSB) Transmission. This is obtained from Double Side-Band (DSB) signals. Hardware, in the form of Hilbert transformers on a chip, exist for this (and many other) purposes. Since the bandwidth of the SSB signal is ideally, half that of the DSB signal, good recovery of the original signal is possible. Also, again for the ideal case, one can safely sample by  $\frac{1}{2}$  (decimation). This means lower power consumption in the transmission process. In practice, the SSB signal is not fully single-side band since it does have non-zero spectra in the negative frequencies. Consequently, the exact signal may not be recovered and decimation will cause aliasing.

The invention, based on theoretical analysis and design, provides a way of designing Hilbert transformers that yield SSB signals that have greater attenuation of the spectrum in the negative frequency range. Accordingly, a better recovery of the signal and less aliasing after decimation becomes possible.

**ADVANTAGES:** The advantage of the new design is a "more truer" SSB signal. Hence better reconstruction. Also when decimating, there is less aliasing and hence a better reconstruction of the original signal. In addition, decimation means smaller sized data and hence less memory and lower power requirements. The invention would apply to a number of important applications. Some of the key ones would be: DSP/SSB convertor, instantaneous frequency estimation, feature detection and signal denoising. The whole (single scale) concept can be extended to a multiscale or multiresolution context.

See: <http://www.emba.uvm.edu/~mirchand/temp/temp20.html>

**PATENT STATUS:** Patent Pending

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