1035-41-1673   **Daniel R Van Vliet*** (`dvanvliet@math.wvu.edu`), Dept. of Mathematics, West Virginia University, 320 Armstrong Hall, PO Box 6310, Morgantown, WV 26506-6310. *Hilbert-Huang Transform and signals with positive instantaneous frequency.*

Hilbert-Huang Transform (HHT) is a two stage signal processing method. A signal is decomposed using the empirical mode decomposition (EMD); the resulting functions are then analyzed using "Hilbert spectrum" analysis. In many applications of HHT, the Hilbert spectrum contains only positive instantaneous frequencies. This is often an important characteristic for approximants to have. When applied to real data, HHT seems to consistently give positive instantaneous frequencies. However, signals have been constructed which could theoretically be produced by the empirical mode decomposition (EMD) - the first stage of HHT, but which have negative instantaneous frequency.

A characterization of analytic signals with nonnegative instantaneous frequency has been found which helps illustrate the connection between EMD and positive instantaneous frequency: why the possibility exists for signals with negative frequency to come from EMD, and why EMD seems not to produce these signals from real world data very often. As well as insights into HHT, this investigation produces results which are of interest on their own. Classes of signals with positive instantaneous frequency which arise from this investigation appear to hold promise as approximating sets for new signal processing methods. (Received September 20, 2007)

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