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**Norden E Huang\*** ([shen@math.sdsu.edu](mailto:shen@math.sdsu.edu)), Research Center for Adaptive Data Analysis, Engineering Building V - C, National Central University, Chungli, Taiwan 32001, Taiwan. *Basic Elements of Empirical Mode Decomposition and Hilbert Spectral Analysis.*

This lecture will review the basics of empirical mode decomposition (EMD), also known as Hilbert-Huang Transform (HHT). A topic to be reviewed is the confidence limit of HHT analysis. The confidence limit is usually defined as the range of standard deviation from mean. Such a confidence limit is valid only to linear and stationary processes. For nonstationary and nonlinear processes, such an analysis is no longer valid. With Hilbert Spectral Analysis, we introduce a confidence limit by using various adjustable stoppage criteria in the sifting processes of the EMD method to generate an ensemble of Intrinsic Mode Function sets. Based on such an ensemble, we compute the ensemble mean and the standard deviation. The confidence limit is then defined as a range of standard deviation from the ensemble mean. Furthermore, without ergodic assumption, we do not have to sub-divide the data into short sections. Therefore, the results and the confidence limit still retain the full frequency resolution as the full data set. Finally, because we do not have to evoke the ergodic assumption, this new confidence can be applied to nonlinear and nonstationary processes. (Received September 21, 2007)