演講公告

時間:2008/11/26(三)下午2:30~3:30 地點:中央大學 太遙中心 R3-112 演講人:羅孟宗 博士 (中央大學數據中心) 講題: Assessment of nonlinear phase interaction between nonstationary signals: A comparison study of methods based on Hilbert-Huang and Fourier transforms

Abstract

Many physical and physiological systems possess multiple feedback interactions among system components or control nodes. Phase relationship among output signals of these system components can provide important information of the interactions, leading insights into underlying control mechanisms. Traditional approaches to quantify phase relationship are based on Fourier transform, which assumes stationary signals consisting of sinusoidal waveforms. However, due to nonlinear coupling among multiple interactions, output signals of complex systems are typically nonstationary (statistical properties such as mean and standard deviation vary with time) Thus, Fourier-based approaches are believed to be unreliable for the analysis of nonstationary signals. To resolve the difficulties related to nonstationarity, Hilbert Huang transform (HHT) that is based on nonlinear chaotic theories, has been designed to extract dynamic information from nonstationary signals at different time scales. Recently, the HHT has been applied to quantify nonlinear phase interaction between two nonstationary physiologic signals, i.e., between blood pressure and cerebral blood flow velocity. Though the HHT-based new method, namely multimodal pressure-flow (MMPF) analysis, was introduced for the assessment of cerebral autoregulation, the method is suitable for the assessment of phase interactions between any two signals. Without the assumption of stationarity, the HHT-based MMPF method is believed to be more reliable than traditional Fourier-based methods.

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