1135-VT-2222 **Rui Liu***, Department of Mathematics and Statistics, P.O. Box 10384, Louisiana Tech University, Ruston, LA 71272, and **Ioannis Vlachos**. *Statistical Dependency in the Frequency Domain for Application in Biological and Natural Systems.* Preliminary report.

Biological and natural systems comprise of multiple components that are (typically) interacting non-linearly and producing multiple outputs of specific frequency characteristics. Without exact knowledge of the underlying mechanism, we are confined to the study and quantitative analysis of time series (observable outputs) to identify the dependencies and increase our understanding of the system. Analysis of the time series in the frequency domain is achieved through Fourier transform, or other similar decomposition procedures, while dependencies can be estimated through specified models, or more general probabilistic frameworks, such as Mutual Information. Herein, the background of this type of analyses is presented and discussed. Additionally, by combining ideas from Information Theory and analysis of time series in the frequency domain, a model-free methodology for quantifying nonlinear dependencies between time series with respect to frequency is developed. Results are presented from applications of this methodology to simulated coupled nonlinear systems data, and to real-world electrophysiological data. (Received September 25, 2017)