

TIME-FREQUENCY ANALYSIS OF EEG SIGNALS
PARTIAL COHERENCE AS A MEASURE OF THE DEPTH OF
CORRELATION BETWEEN SIGNALS

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Epilepsy is one of the most commonplace neurological disorder among people around the world. Electroencephalography EEG is a powerful technique used to record the electrical activity of the brain and can play a crucial role in distinguishing epilepsy from the other brain disorders as well as determine the location of the onset of an epileptic seizure. This work aims to investigate the electrical activity of the brain, which is produced by the interacting of large number of neurons, under epileptic conditions. The spectral analysis of the underlying data is provided by using non-parametric spectral estimations, namely the averaging periodograms across contiguous sections of single records, smoothing the periodogram of the entire record, and the multi-taper method. Moreover, a comparison between these methods will be made in order to decide which of them is more accurate in estimating spectral densities. Coherence and partial coherence are used to measure the strength of the correlations between signals.

REFERENCE

- [1] Adeli, H., Zhou, Z., Dadmehr, N. Analysis of EEG records in an epileptic patient using wavelet transform. *J Neurosci Methods*, Vol. (123), 69-87 (2003).
- [2] Amjad, A., Haliday, D., Rosenberg, J., Conway, B. An extended difference of coherence test for comparing and combining several independent coherence estimates: theory and application to the study of motor units and physiological tremor. *J Neurosci Methods*. Vol.(73), pp:69-79 (1997)
- [3] Brillinger, D. *Time Series: data analysis and theory*. Holden-Day, Inc. 500 Sansome Street, San Francisco, California 94111 (1981)