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Harmonic spectral components in time sequences of Markov correlated events with an application to EEG and MEG signals

Monday, 4 September 2017 16:30 (30 minutes)

The talk is addressed to the analysis of time sequences of Markov correlated events give rise to a line power spectrum having a relevant physical interest. In particular, Markov matrices able to represent closed loop sequences of events with arbitrary distribution, generated in a steady physical condition, generate a large set of line spectra, covering a very broad frequency range. The spectral lines is given by a matrix equation based on a generalized Markov matrix involving the Fourier transform of the distribution functions representing the time intervals between successive events of the sequence. The theoretical power spectra is then applied to describe the emergence of a broad set of waves found in the electro and magneto-encephalograms, whose frequency ranges from 0.5 to about 40 Hz, in terms of the effects produced by chains of firing neurons within the complex neural network of the brain. Synchronized closed loop sequences of firing neurons are considered and a few numerical simulations are reported.

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