Time Average Estimation in the Fraction-of-Time Probability Framework

Dominique Dehay, Jacek Leśkow, Antonio Napolitano

PII: S0165-1684(18)30229-9
DOI: 10.1016/j.sigpro.2018.07.005
Reference: SIGPRO 6869

To appear in: *Signal Processing*

Received date: 23 March 2018
Revised date: 12 June 2018
Accepted date: 6 July 2018

Please cite this article as: Dominique Dehay, Jacek Leśkow, Antonio Napolitano, Time Average Estimation in the Fraction-of-Time Probability Framework, *Signal Processing* (2018), doi: 10.1016/j.sigpro.2018.07.005

Highlights

- The problem of time average estimation is addressed in the fraction-of-time (FOT) probability framework, where the observed signal is modeled as a single function of time rather than as a sample path of a stochastic process.
- Classical results as the central limit theorem for the normalized estimation error are derived without resorting to ergodicity assumptions that cannot be verified in practice. Rather, assumptions are made on the unique function of time at the hands of the experimenter.
- Results on the distribution of the estimation error are derived for the almost-periodic functions. Such results cannot be derived in the classical stochastic approach.
- The estimation of the cyclic autocorrelation function of a non-zero mean cyclostationary signal is afforded in the FOT probability framework. A rigorous justification is given in this framework for the consistency of the estimator and the asymptotic normality of the normalized error. The result is adopted for cyclostationary signal detection.