Approximate Moving Average Representation of Stochastic Cycles

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Abstract

This paper shows that a moving average of independent random variables with normal distribution converges to a stochastic cycle. The difficulty comes from the fact that since a stochastic cycle does not have a spectral density, it can not be directly represented by a moving average. The results of this paper are twofold. Our first result is that the stochastic process originally constructed by Slutzky (1937) is not a convergent sequence in L^2. The second is that we propose a new moving average process which converges to a nontrivial stochastic cycle in L^2 and almost surely.