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Mixture results for extremal behaviour of strongly dependent nonstationary Gaussian sequences

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Abstract

Let $\{X_n\}$ be a nonstationary Gaussian sequence. In this work we introduce a condition on $r_{ij} = Cor(X_i, X_j), i, j \geq 1$ that models a strong dependence struture. We prove that the limit of the point process of exceedances is a Cox process i.e. a point process whose distribution is a mixture of distributions of simple Poisson processes, regulated by a standard normal law. Moreover, we study the joint limit distribution of the maxima and minima, under linear normalization, and we again find a doubly stochastic behaviour.

Key Words: Cox process, exceedances, extremes, Gaussian processes, point processes.
AMS subject classification: 60G70, 60G15

1 Introduction

Extreme value theory for Gaussian sequences has been drawing the atention of many authors, for instance, Berman (1964), Mittal and Ylvisaker (1975), Rootzén (1983), Hüsler (1983), Leadbetter et al. (1983), who have been dealing with the limit distribution of suitable normalized extreme values.

Let $\{X_n\}$ be a nonstationary Gaussian sequence with $E(X_j) = m_j$, $Var(X_j) = \sigma_j^2$ and correlations r_{ij}, $i, j \geq 1$, $i \neq j$. Define the maxima $M_n = \max_{1 \leq j \leq n} X_j$ and the minima $W_n = \min_{1 \leq j \leq n} X_j$.

It is well known that if $\{X_n\}$ is i.i.d. with standard marginal distribution, the maxima, with linear normalization, converges in distribution to a

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