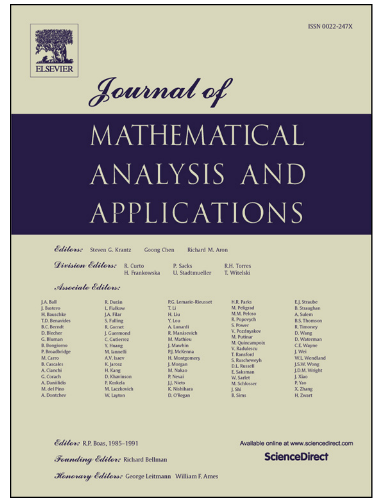

Asymptotic behavior of bivariate Gaussian powered extremes

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Asymptotic behavior of bivariate Gaussian powered extremes

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Abstract In this paper, joint asymptotics of powered maxima for a triangular array of bivariate Gaussian random vectors are considered. Under the Hüsler-Reiss condition, limiting distributions of powered maxima are derived. Furthermore, the second-order expansions of the joint distributions of powered maxima are established under the refined Hüsler-Reiss condition.

Keywords Hüsler-Reiss max-stable distribution; bivariate powered Gaussian maximum; second-order expansion

AMS 2000 subject classification Primary 62E20, 60G70; Secondary 60F15, 60F05.

1 Introduction

For independent and identically distributed bivariate Gaussian random vectors with constant coefficient in each vector, Sibuya (1960) showed that componentwise maxima are asymptotically independent, and Embrechts et al. (2003) proved the asymptotical independence in the upper tail. To overcome those shortcomings in its applications, Hüsler and Reiss (1989) considered the asymptotic behaviors of extremes of Gaussian triangular arrays with varying coefficients. Precisely, let $\{(X_{ni}, Y_{ni}), 1 \le i \le n, n \ge 1\}$ be a triangular array of independent bivariate Gaussian random vectors with $\mathrm{E}\, X_{ni} = \mathrm{E}\, Y_{ni} = 0$, $\mathrm{Var}\, X_{ni} = \mathrm{Var}\, Y_{ni} = 1$ for $1 \le i \le n$, $n \ge 1$. and $\mathrm{Cov}(X_{ni}, Y_{ni}) = \rho_n$. Let $F_{\rho_n}(x, y)$ denote the joint distribution of vector (X_{ni}, Y_{ni}) for $i \le n$. The partial maxima

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