

# Random vectors in the presence of a single big jump

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## Abstract

Multidimensional distributions with heavy tails recently attracted the attention of several papers on Applied Probability. However, most of the works, of the last decades focused on the multivariate regular variation, while the rest of the heavy-tailed distribution classes not studied extensively. About multivariate subexponentiality we can find several approximations, but none of them get established widely. Having in mind the single big jump principle, and further the multivariate subexponentiality suggested by Samorodnitsky and Sun (2016), we introduce the multivariate long, dominatedly and consistently varying distribution classes. We examine the closure properties of these classes with respect to the product convolution, to the scale mixture and the convolution of random vectors. Especially, for infinitely divisible random vectors, with multivariate subexponential and dominatedly varying distributions, we provide some asymptotic equivalencies, between the tail of the linear combinations of the components of the vectors and their Levy measure. Furthermore, we study the single big jump principle in finite and in random sums of random vectors, permitting some dependence structures, which contains as special case the independence. Finally, we present an application on the asymptotic evaluation of the present value of the total claims in a risk model, with common Poisson counting process, financial factors and independent, identically distributed claims, with common multivariate subexponential distribution.

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