GEOMETRIC STABLE AND SEMISTABLE DISTRIBUTIONS ON $\mathbf{Z}_+^d$

Nadjib Bouzar

Abstract: The aim of this article is to study geometric $\mathcal{F}$-semistable and geometric $\mathcal{F}$-stable distributions on the d-dimensional lattice $\mathbf{Z}_+^d$. We obtain several properties for these distributions, including characterizations in terms of their probability generating functions. We describe a relation between geometric $\mathcal{F}$-semistability and geometric $\mathcal{F}$-stability and their counterparts on $\mathbf{R}_+^d$ and, as a consequence, we derive some mixture representations and construct some examples. We establish limit theorems and discuss the related concepts of complete and partial geometric attraction for distributions on $\mathbf{Z}_+^d$. As an application, we derive the marginal distribution of the innovation sequence of a $\mathbf{Z}_+^d$-valued stationary autoregressive process of order p with a geometric $\mathcal{F}$-stable marginal distribution.

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