

CHARACTERIZATIONS OF  $\mathcal{F}$ -STABLE AND  $\mathcal{F}$ -SEMISTABLE  
DISTRIBUTIONS

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*Abstract:* The notion of  $\mathcal{F}$ -stability of van Harn et al. [10] (see also Steutel and van Harn [20]) and the related concept of  $\mathcal{F}$ -semistability are intimately connected with continuous-time branching processes.  $\mathcal{F}$ -stable and  $\mathcal{F}$ -semistable distributions play also a significant role in the theory of integer-valued (semi-)self-similar processes and have arisen as stationary solutions of integer-valued autoregressive processes. The aim of this article is twofold. Firstly, we provide several new characterizations of univariate  $\mathcal{F}$ -stable and  $\mathcal{F}$ -semistable distributions. Secondly, we propose a systematic study of  $\mathcal{F}$ -stability and  $\mathcal{F}$ -semistability for distributions on the  $d$ -dimensional lattice  $\mathbf{Z}_+^d$ .

**2000 AMS Mathematics Subject Classification:** Primary: 60E07; Secondary: 62E10.

**Keywords and phrases:** Semigroup, infinite divisibility, branching processes, probability generating functions, discrete multivariate distributions, the Lau–Rao theorem.

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