SOME REMARKS ON SCALING TRANSITION IN LIMIT THEOREMS FOR RANDOM FIELDS

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The notion of scaling transition for random fields was introduced in [4] and was observed in several stationary linear fields, see, for example, [2, 3].

Let us consider the random field

\[ Z_{n,\gamma}(t,s) = \sum_{k=1}^{n^{|t|}} \sum_{l=1}^{n^{|s|}} Y_{k,l}, \quad t \geq 0, \quad s \geq 0, \]

obtained by summing values of a stationary random field \( Y \), and let us assume that, for any \( \gamma > 0 \), there exists a nontrivial random field \( V_{\gamma}(t,s) \) and a normalization \( A_n(\gamma) \to \infty \) such that finite dimensional distributions (f.d.d.) of \( A_n^{-1}(\gamma)Z_{n,\gamma}(t,s) \) converge weakly to f.d.d. of \( V_{\gamma} \).

Definition 1. We say that the random field \( Y \) exhibits scaling transition if there exists \( \gamma_0 > 0 \) such that the limit process \( V_{\gamma} \) is the same, say \( V_+ \), for all \( \gamma > \gamma_0 \) and another, not obtained by simple scaling, \( V_- \), for \( \gamma < \gamma_0 \).

In this talk, based on [1], we give some simple examples of linear fields exhibiting scaling transition. The simple construction enables us to obtain several points of transition, investigate fields indexed by \( d \)-dimensional indices and also investigate the case of negative dependence.

References