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Eventual Intersection for Sequences of Lévy Processes

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Abstract

Consider the events ${F_n cap bigcup_{k=1}^{n-1} F_k = emptyset}$, $n in N$, where $(F_n)_{n=1}^infty$ is an i.i.d. sequence of stationary random subsets of a compact group G. A plausible conjecture is that these events will not occur infinitely often with positive probability if $P{F_i cap F_j ne emptyset , | , F_j} > 0$ a.s. for $i ne j$. We present a counterexample to show that this condition is not sufficient, and give one that is. The sufficient condition always holds when $F_n = {X_t^n : 0 le t le T}$ is the range of a Lévy process X^n on the d-dimensional torus with uniformly distributed initial position and $P{exists 0 le s, t le T : X_s^i = X_t^j } > 0$ for $i ne j$. We also establish an analogous result for the sequence of graphs ${(t,X_t^n) : 0 le t le T}$.

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