Zhang, L.-X.

A functional central limit theorem for asymptotically negatively dependent random fields.
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Let $\{X_k; k \in N^d\}$ be a random field which is asymptotically negative dependent in a certain sense, e.g. X and Y are said to be negatively quadrant dependent (NQD) if

$$P(X \le x, Y \le y) - P(X \le x) \cdot P(Y \le y) \le 0$$

for all $x, y \in R$. The field is said to be linear NQD if for any disjoint finite sets $A, B \subset N^d$ and any positive real numbers r_i, r_j the sums $\sum_{i \in A} r_i X_i$ and $\sum_{j \in B} r_j X_j$ are NQD and so on, see, e.g., *E. L. Lehmann* [Ann. Math. Stat. 37, 1137-1153 (1966; Zbl 0146.40601)]. Because of their wide applications in multivariate statistical analysis and reliability theory the notions of negative dependence have received more and more attention recently, see e.g., *T. Birkel* [J. Multivariate Anal. 44, No. 2, 314-320 (1993; Zbl 0770.60037)], *C. M. Newman* and *A. L. Wright* [Ann. Probab. 9, 671-675 (1981; Zbl 0465.60009)] or *C. Su, L. Zhao* and *Y. B. Wang* [Sci. China, Ser. A 40, No. 2, 172-182 (1997; Zbl 0907.60023)]. Under some suitable conditions it is shown that the partial sum process $W_n(t) = \sigma_n^{-1} \sum_{m \le n \cdot t} (X_m - EX_m)$ for $t \in [0,1]^d$, converges in distribution to a Brownian sheet. Consequences of this result are functional central limit theorems on negative dependent random fields. The main result is based on some general theorems on asymptotically negatively dependent random fields, which are of independent interest.

Reviewer: Ludwig Paditz (Dresden)

MSC:

60F17 Functional limit theorems; invariance principles
60F05 Central limit and other weak theorems
60B10 Convergence of probability measures

Keywords:

functional central limit theorem; convergence in distribution; Brownian sheet; partial sum process; asymptotically negatively dependent; random field

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