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EXTREME VALUE THEORY FOR ASYMPTOTIC STATIONARY SEQUENCES

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Abstract: The problem of behaviour of $a_n(\max_{1\le k\le n} X_k - b_n)$ is considered when $a_n > 0$, $|b_n| < \infty$ and the sequence $X = \{X_k, k \ge 1\}$ is asymptotically stationary in variation.

X is said to be $asymptotically\ stationary\ in\ variation$ if $||\mathcal{L}(X_n) - \mathcal{L}(X^0)|| \to 0$, where $X_n = \{X_{n+k}, k \ge 1\}$, while $\mathcal{L}(X_n)$ and $\mathcal{L}(X^0)$ denote the distributions of the sequences X_n and $X^0 = \{X_k^0, k \ge 1\}$, respectively. The sequence X^0 of random variables X_k^0 is stationary and it is said to be a stationary representation of X.

The main result states: under $||\mathcal{L}(X_n) - \mathcal{L}(X^0)|| \to 0$ and some natural conditions concerned X and X^0, the sequence of distributions $\mathcal{L}(a_n(\max_{1\le k\le n} X_k - b_n))$ weakly converges provided the sequence of $\mathcal{L}(a_n(\max_{1\le k\le n} X_k^0 - b_n))$ weakly converges and the limits are the same. An analogous result is also formulated for the processes of exceedances.

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