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Strong Law of Large Numbers Under a General Moment Condition

Sergei Chobanyan, *Georgian Academy of Sciences, Georgia*
Shlomo Levental, *Michigan State University, USA*
Habib Salehi, *Michigan State University, USA*

Abstract

We use our maximum inequality for p-th order random variables $(p>1)$ to prove a strong law of large numbers (SLLN) for sequences of p-th order random variables. In particular, in the case $p=2$ our result shows that $\sum f(k)/k < \infty$ is a sufficient condition for SLLN for f-quasi-stationary sequences. It was known that the above condition, under the additional assumption of monotonicity of f, implies SLLN (Erdös (1949), Gal and Koksma (1950), Gaposhkin (1977), Moricz (1977)). Besides getting rid of the monotonicity condition, the inequality enables us to extend thegeneral result to p-th order random variables, as well as to the case of Banach-space-valued random variables.

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