STRONG LIMIT THEOREMS FOR THE RANDOM SUMS AND LÉVY PROCESSES

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General results concerning strong invariance principle (almost sure approximation) for the superposition of the random processes $S(N(t))$ are discussed, when càd-làg random processes $S(t)$ and $N(t)$ themselves admit a.s. approximation by a Wiener or stable Lévy processes. Such results serve as a source of numerous strong limit theorems for the random sums $D(t) = S(N(t)) = \sum_{i=1}^{N(t)} x_i$ under various assumptions on counting renewal process $N(t)$ and moment conditions on i.i.d. summands $\{x_i, i \geq 1\}$. As the consequences a number of SIP-type results are obtained for random sums and used to investigation their rate of growth and fluctuation of increments; particularly, various modifications of the LIL and Erdös-Rényi-Csörgő-Révész LLN for random sums are proved. Finally, such approach is used for investigation the asymptotic behavior of the risk processes in the classical and renewal risk models with small and large claims.