The Laplace Distribution in Random Summation Scheme: Limit Theorems and Applications

Vladimir Bening and Roman Korolev
The 33rd Finnish Summer School on Probability Theory and Statistics
and
Lomonosov Moscow State University

Abstract:
First we retrieve some facts about Laplace distribution. We show that the Laplace distribution can be represented as a scale mixture of well-known distributions. Then we extend the idea and give the necessary and sufficient conditions under which the distributions of asymptotically normal statistics based on samples of random size converge to a predetermined distribution. We use this general result and derive a limit theorem in which the Laplace distribution arises as the limiting distribution of the asymptotically normal statistics when the random size of sample has the limiting inverse exponential distribution. Then we consider an example of random size having such property. Finally we discuss some applications of the results in statistics and testify to increased popularity of the Laplace distribution as a probabilistic model in applied economics and science.