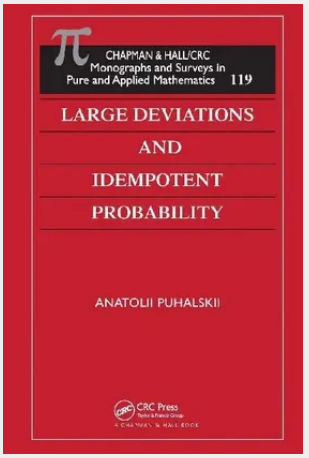
Puhalskii

Large Deviations and Idempotent Probability

In the view of many probabilists, author Anatolii Puhalskii's research results stand among the most significant achievements in the modern theory of large deviations. In fact, his work marked a turning point in the depth of our understanding of the connections between the large deviation principle (LDP) and well-known methods for establishing weak convergence results. Large Deviations and Idempotent Probability expounds upon the recent methodology of building large deviation theory along the lines of weak convergence theory. The author develops an idempotent (or maxitive) probability theory, introduces idempotent analogues of martingales (maxingales), Wiener and Poisson processes, and Ito differential equations, and studies their properties. The large deviation principle for stochastic processes is formulated as a certain type of convergence of stochastic processes to idempotent processes. The author calls this large deviation convergence. The approach to establishing large deviation convergence uses novel compactness arguments. Coupled with the power of stochastic calculus, this leads to very general results on large deviation asymptotics of semimartingales. Large and moderate deviation asymptotics are treated in a unified manner. Starting with the foundations of idempotent measure theory and culminating in applications to large deviation asymptotics of queueing systems, Large Deviations and Idempotent Probability offers an outstanding opportunity to examine both the development of a remarkable approach and recently discovered results as presented by one of the foremost leaders in the field.

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