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Integral and local limit theorems for level crossings of diffusions and the Skorohod problem

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Abstract

Using a new technique, based on the regularization of a càdlàg process via the double Skorohod map, we obtain limit theorems for integrated numbers of level crossings of diffusions. The results are related to the recent results on the limit theorems for the truncated variation. We also extend to diffusions the classical result of Kasahara on the "local" limit theorem for the number of crossings of a Wiener process. We establish the correspondence between the truncated variation and the double Skorohod map. Additionally, we prove some auxiliary formulas for the Skorohod map with time-dependent boundaries.

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