

# Penalized nonparametric drift estimation in continuous time one-dimensional diffusion

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## Abstract

We consider the problem of drift estimation for a one dimensional positive recurrent diffusion observed continuously in time. We propose a non parametric estimator which is obtained by penalization. The estimator belongs to a finite dimensional function space whose dimension is chosen by a data driven method, the so-called method of model selection. We do not assume that the process is in stationary regime and we work under the most less restrictive conditions concerning the recurrence behaviour that seem to be possible.

One main probabilistic ingredient is a deviation inequality for the ergodic theorem which is interesting in its own right. This inequality is obtained using the regeneration method, under conditions ensuring the existence of  $p$ -th moments of hitting times. The last part of the talk is devoted to a closer study of the integrability of hitting times. This study gives rise to a characterization of the recurrence behaviour.