

# Nonparametric estimation for scalar diffusions from low frequency data is ill-posed

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We consider the problem of estimating the drift and diffusion coefficient of a scalar ergodic diffusion from discrete observations. In contrast to other approaches we do not assume the time distance between the observations to be asymptotically small, but work with a fixed distance and the asymptotics of long time observations. As it turns out, the estimation theory is completely different and an ill-posed inverse problem is hidden. We establish non-classical minimax rates for  $L^2$ -loss and Sobolev function classes and present a first simulation study which compares a high- and our low-frequency estimator for finite data samples.

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