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Estimation for Dynamical Systems with Small Noise from Discrete Observations

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Abstract: We consider an efficient estimation of an unknown parameter appearing in both the drift and the diffusion coefficient for a d-dimensional dynamical system with small noise. Asymptotic properties of an M-estimator obtained from an approximate quadratic martingale estimating function are stated. The sample path is observed at equidistant times k/n, $k = 0,1,\ldots, n$. The type of asymptotics considered is when a small dispersion parameter ε goes to 0 and n goes to ∞ simultaneously.

Key words: discrete time observation, dynamical systems with small noise, M-estimator, parametric inference, quadratic martingale estimating function

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