
Tamed Euler scheme for SDEs/SPDEs with distributional drift and additive noise

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Résumé

We study the well-posedness and numerical approximation of SDEs and SPDEs with distributional drift, driven by a fractional Brownian motion. Under a condition that relates the Hurst parameter H of the noise to the Besov regularity of the drift, we study the error between a solution X of the SDE with drift b and its tamed Euler scheme with mollified drift b_n . We obtain a rate of convergence in $L_m(\Omega)$ for this error, which depends on the Besov regularity of the drift. This result covers the critical case of the regime of strong existence and pathwise uniqueness. When the Besov regularity increases and the drift becomes a bounded measurable function, we recover the (almost) optimal rate of convergence $1/2 - \epsilon$. The proofs rely on stochastic sewing techniques, especially to deduce new regularising properties of the discrete-time fractional Brownian motion. We also present several examples and numerical simulations that illustrate our results.

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