

Title:

Fast Particle Filters and Their Applications to Recursive Identification and Adaptive Control of Nonlinear Stochastic Systems

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Abstract:

By proper choice of proposal distributions for importance sampling and of resampling schemes for sequentially updating the importance weights, this paper develops fast particle filters that can be implemented via parallel recursions for on-line identification and adaptive control of nonlinear stochastic systems. Theoretical analysis and simulation studies show the superiority of this new approach over conventional methods for identification and adaptive control of ARX models with occasional parameter jumps. Another nonlinear identification problem considered herein is combined system identification and state estimation in state space models, for which it is shown how particle filters can circumvent the complexities of the problem due to inherent nonlinearities.