

Particle Filter State Estimation Algorithm Based on Improved Artificial Bee Colony Algorithm

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Abstract : In order to solve the problem of sample dilution in the traditional particle filter algorithm and achieve accurate state estimation in a nonlinear system, a particle filter method based on an improved artificial bee colony (ABC) algorithm was proposed. The algorithm simulated the process of bee foraging and optimization and made the high likelihood region of the backward probability of particles moving to improve the rationality of particle distribution. The opposition-based learning (OBL) strategy is introduced to optimize the initial population of the artificial bee colony algorithm. The convergence factor is introduced into the neighborhood search strategy to limit the search range and improve the convergence speed. Finally, the crossover and mutation operations of the genetic algorithm are introduced into the search mechanism of the following bee, which makes the algorithm jump out of the local extreme value quickly and continue to search the global extreme value to improve its optimization ability. The simulation results show that the improved method can improve the estimation accuracy of particle filters, ensure the diversity of particles, and improve the rationality of particle distribution.

Keywords : particle filter, impoverishment, state estimation, artificial bee colony algorithm

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