

工程与应用

基于智能优化的移动机器人轨迹跟踪控制

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摘要 建立了机器人运动学模型, 设计了基于Lyapunov稳定理论的轨迹跟踪控制器, 该控制器的性能取决于其参数的大小。粒子群优化算法具有收敛速度快, 需要调节的参数少等优点, 但优化过程中容易发生“早熟”收敛, 使优化陷入局部极小值。通过引入模拟退火算法、“交叉算子”和“变异算子”, 提出了一种改进粒子群优化算法, 对控制器的参数进行优化设计。最后, 通过仿真计算, 证明了该方法的有效性。

关键词 [移动机器人](#) [轨迹跟踪](#) [控制规律](#) [改进粒子群算法](#)

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Tracking control of mobile robot based on intelligent optimization

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Abstract

Kinematic model of mobile robot and controller based on Lyapunov steady theory are formed. This controller's performance is depend on its parameters. Particle Swarm Optimization (PSO) has the advantage of fast convergence speed and few parameters to adjust, but premature convergence often occurs during optimization. SA, "intercross operator" and "aberrance operator" are combined to improve PSO's performance, a new Improved Particle Swarm Optimization (IPSO) is formed to optimize the controller's parameters. At last, simulation results are provided to illustrate the flexibility and correctness of the controller.

Key words [mobile robot](#) [tracking control](#) [control rule](#) [improved particle swarm optimization](#)

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