

制导、导航与控制

多变量非线性系统的直接自适应模糊预测控制

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摘要:

对一类多变量非线性系统提出了直接自适应模糊预测控制方法,此方法首先对被控对象提出了线性时变子模型加非线性子模型的预测模型,然后直接利用模糊系统设计预测控制器,并基于时变增益自适应律对控制器中的未知向量和逼近误差估计值进行自适应调整。证明了此方法可使跟踪误差收敛到原点的一个邻域内,仿真结果验证了此方法的有效性。

关键词: 未知多变量非线性系统; 自适应模糊控制; 预测控制; 时变增益自适应律

Direct adaptive fuzzy predictive control for a class of multivariable nonlinear systems

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Abstract:

A direct adaptive fuzzy predictive control method for a class of unknown multivariable nonlinear systems is presented. In this method, the plant is represented by a predictive model consisting of a linear time varying submodel plus a nonlinear submodel, then the fuzzy systems are used to design a predictive controller directly, and the unknown vector in the controller and the estimated value of the approximation error are adjusted by the time-varying gain adaptive law. It is proved that the proposed method can make the tracking error converge to a neighborhood of the origin. Simulation results demonstrate the effectiveness of the proposed control scheme.

Keywords: unknown multivariable nonlinear system adaptive fuzzy control predictive control time varying gain adaptive law

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