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RESEARCH PAPERS

具有软硬约束的混合权系数最小二乘稳定预测控制算法

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摘要 Mixed-weight least-squares (MWLS) predictive control algorithm, compared with quadratic programming (QP) method, has the advantages of reducing the computer burden, quick calculation speed and dealing with the case in which the optimization is infeasible. But it can only deal with soft constraints. In order to deal with hard constraints and guarantee feasibility, an improved algorithm is proposed by recalculating the setpoint according to the hard constraints before calculating the manipulated variable and MWLS algorithm is used to satisfy the requirement of soft constraints for the system with the input constraints and output constraints. The algorithm can not only guarantee stability of the system and zero steady state error, but also satisfy the hard constraints of input and output variables. The simulation results show the improved algorithm is feasible and effective.

关键词 mixed-weight least-squares predictive control soft constraints hard constraints feasibility

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Mixed-Weights Least-Squares Stable Predictive Control Algorithm with Soft and Hard Constraints

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Abstract Mixed-weight least-squares (MWLS) predictive control algorithm, compared with quadratic programming (QP) method, has the advantages of reducing the computer burden, quick calculation speed and dealing with the case in which the optimization is infeasible. But it can only deal with soft constraints. In order to deal with hard constraints and guarantee feasibility, an improved algorithm is proposed by recalculating the setpoint according to the hard constraints before calculating the manipulated variable and MWLS algorithm is used to satisfy the requirement of soft constraints for the system with the input constraints and output constraints. The algorithm can not only guarantee stability of the system and zero steady state error, but also satisfy the hard constraints of input and output variables. The simulation results show the improved algorithm is feasible and effective.

Key words mixed-weight least-squares; predictive control; soft constraints; hard constraints; feasibility

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