中南大学学报 自然科学版 英文版

教育部 主管
中南大学 主办

论文摘要

中南大学学报(自然科学版)

ZHONGNAN DAXUE XUEBAO(ZIRAN KEXUE BAN)

Vol.41 No.3 Jun.2010

[PDF全文下载] [全文在线阅读]

文章编号：1672-7207(2010)03-1046-06

活性污泥污水处理系统的最优鲁棒H_∞保成本控制

徐华[1，2]，薛恒新[1]，王士同[2]

(1．南京理工大学 经济管理学院，江苏 南京，210094；
2．江南大学 信息工程学院，江苏 无锡，214122)

摘 要：针对具有凸多面体参数不确定性的污水处理控制系统，研究其鲁棒H_∞保成本控制器的设计问题。首先，给出变参数活性污泥系统的状态空间模型；然后，结合二次型性能指标和H_∞性能指标，导出系统鲁棒H_∞保成本控制器存在的充分条件以及相应的控制器设计方法，并通过线性矩阵不等式，给出该控制器增益的可行解。以某污水厂污水性质和处理能力为例，应用所设计的鲁棒H_∞保成本控制器进行仿真研究。仿真结果表明：采用该方法使系统最终的稳态误差较小，证明该方法是可行和有效的。

关键字：活性污泥系统；凸多面体参数不确定性；H_∞保成本控制；鲁棒控制；线性矩阵不等式

O, ptimal robust H_∞ guaranteed cost control for activated sludge sewage treatment system

XU Hua[1, 2], XUE Heng-xin[1], WANG Shi-tong[2]

（1. School of Economics and Management, Nanjing University of Science and Technology, Nanjing 210094, China;
2. School of Information Engineering, Southern Yangtze University, Wuxi 214122, China）

Abstract: The problem of robust H_∞ guaranteed cost controller design was studied for wastewater treatment control systems with polytopic uncertainties. Firstly, the state space model of activated sludge system with uncertain parameters was established. Then, combined with the quadratic performance index and H_∞ performance index, a sufficient condition for the existence of robust H_∞ guaranteed cost controller was derived and its design procedures were also given. Meanwhile, the controller gain was obtained by applying linear matrix inequality technique. Finally, take a wastewater treatment plant sewage treatment capacity of nature for example, and applying the design of robust H_∞ guaranteed cost controller to simulate. The results show that the steady-state system has smaller error using the method, which proves the method is feasible and effective.

Key words:activated sludge system; polytypic uncertainties; H_∞ guaranteed cost control; robust control; linear matrix inequality

地 址：湖南省长沙市中南大学 邮编： 410083
电 话： 0731-88879765 传真： 0731-88877727
电子邮箱： zngdxb@mail.csu.edu.cn 湘ICP备09001153号