

短文

具有反馈信息的迭代学习控制律在Lebesgue- p 范数意义下的收敛性

阮小娥, 连建帮, 吴慧卓

1. 西安交通大学理学院数学系 西安 710049

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摘要

针对一类线性时不变系统, 提出了具有反馈信息的PD-型(Proportional-derivative-type)迭代学习控制律, 利用卷积的推广的Young不等式, 分析了控制律在Lebesgue- p 范数意义下的单调收敛性. 分析表明, 收敛性不但决定于系统的输入输出矩阵和控制律的微分学习增益, 而且依赖于系统的状态矩阵和控制律的比例学习增益; 进一步, 当适当选取反馈增益时, 反馈信息可加快典型的PD-型迭代学习控制律的单调收敛性. 数值仿真验证了理论分析的正确性和控制律的有效性.

关键词 [迭代学习控制](#) [反馈](#) [Lebesgue- \$p\$ 范数](#) [单调收敛](#)

分类号

Convergence of Iterative Learning Control with Feedback Information in the Sense of Lebesgue- p Norm

RUAN Xiao-E, LIAN Jian-Bang, WU Hui-Zhuo

1. Department of Mathematics, Faculty of Science, Xi'an Jiaotong University, Xi'an 710049

Abstract

This paper addresses a kind of proportional-derivative-type (PD-type) iterative learning control updating law with feedback information for a class of linear time-invariant systems. By taking advantage of the generalized Young inequality of convolution integral, monotone convergence of the updating law is analyzed in the sense of Lebesgue- p norm. The analysis indicates that the convergence is determined not only by the system input-output matrix and the derivative learning gain, but also by the system state matrix and the proportional learning gain. It is further shown that the feedback information may speed up the convergence of the typical PD-type rule when the feedback gains are properly chosen. Numerical simulation exhibits the validity and the effectiveness.

Key words [Iterative learning control](#) [feedback](#) [Lebesgue- \$p\$ norm](#) [monotone convergence](#)

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通讯作者 阮小娥 wruanxe@xjtu.edu.cn

作者个人主页 阮小娥; 连建帮; 吴慧卓

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