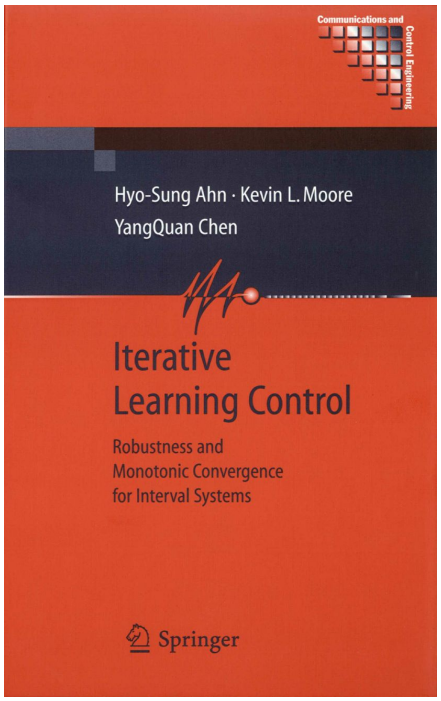

Springer

1st edition

2007, XVIII, 230 p. 36 illus., 4 illus. in color.

Printed book
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Hardcover
ISBN 978-1-84628-846-3
$ 219,99
Available

Discount group
Professional Books (2)

Product category
Monograph

Series
Communications and Control Engineering

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ISBN 978-1-84996-658-0

Engineering : Control

Ahn, H.-S., Moore, K.L., Chen, Y.

Iterative Learning Control

Robustness and Monotonic Convergence for Interval Systems

- Shows the reader how to use robust iterative learning control in the face of model uncertainty
- Helps to improve the performance of repetitive electromechanical tasks, widespread in industry
- Provides a rounded and self-contained approach to the subject of iterative learning control not available elsewhere

This monograph studies the design of robust, monotonically-convergent it- ative learning controllers for discrete-time systems. Iterative learning control (ILC) is well-recognized as an e? cient method that o?ers signi?cant p- formance improvement for systems that operate in an iterative or repetitive fashion (e. g. , robot arms in manufacturing or batch processes in an industrial setting). Though the fundamentals of ILC design have been well-addressed in the literature, two key problems have been the subject of continuing - search activity. First, many ILC design strategies assume nominal knowledge of the system to be controlled. Only recently has a comprehensive approach to robust ILC analysis and design been established to handle the situation where the plant model is uncertain. Second, it is well-known that many ILC algorithms do not produce monotonic convergence, though in applications monotonic convergencecan be essential. This monograph addresses these two keyproblems by providingauni?ed analysisanddesignframeworkforrobust, monotonically-convergent ILC. The particular approach used throughout is to consider ILC design in the iteration domain, rather than in the time domain. Using a lifting technique, the two-dimensionalILC system, whichhas dynamics in both the time and - erationdomains,istransformedintoaone-dimensionalsystem, withdynamics only in the iteration domain. The so-called super-vector framework resulting from this transformation is used to analyze both robustness and monotonic convergence for typical uncertainty models, including parametric interval - certainties, frequency-like uncertainty in the iteration domain, and iterati- domain stochastic uncertainty.

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ISBN 978-1-84628-846-3 / BIC: TJFM / SPRINGER NATURE: SCT19010