Digital Control Theory

Student notes: lectures and exercises

written by

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Introduction

The present book, **Digital Control Theory,** has been developed for undergraduate studies in the field of systems and control engineering. The book aims to summarise the essential topics on digital control theory. It is assumed that the reader is familiar with the basics of systems and control engineering, the continuous-time control design and the basic understanding of Z transformation.

The book is based on the graduate course, "Digitaallinen Säätöteoria 47453S", given at the Systems Engineering Laboratory, University of Oulu in the period of 1996-2002.

The book serves as a textbook: describes the theoretical background deep enough to understand and execute the related exercises. It has three main parts: 1) introduction to the computer controlled systems and the sampling phenomenon, 2) description of the process modelling in discrete-time domain and finally 3) introduction of several discrete-time design methods.

The following references were used in completing the book:

G. Franklin, J.D. Powell & M. Workman (1998): Digital Control of Dynamic Systems. Addison-Wesley, third edition.

I.D. Landau (1990): System Identification and Control Design. Prentice-Hall, Inc.

K. Ogata (1995): Discrete-time Control Systems. Prentice-Hall, Inc., second edition.

K. Ogata (1995): Solution manual – Discrete-time Control Systems. Prentice-Hall, Inc., second edition.

Ch.L. Phillips, (1990): Digital control system analysis and design. Englewood Cliffs (N.J.) Prentice-Hall Inc., second edition.

K.J. Åström & B. Wittenmark (1997): Computer-Controlled Systems. Prentice-Hall, Inc., third edition.

K.J. Åström & B. Wittenmark (1997): Solutions Manual - Computer-Controlled Systems, Theory and Design. Prentice-Hall, Inc., first edition.

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