

A New Book “NUMERICAL METHODS FOR LINEAR CONTROL SYSTEMS DESIGN  
AND ANALYSIS”

by Biswa Nath Datta

I am pleased to announce publication of my book: “Numerical Methods for Linear Control Systems Design and Analysis” Elsevier Academic Press, 2003 (ISBN: 0-12-203590-9).

The book describes the state-of-the-art computationally viable algorithms for major tasks arising in linear control systems design and analysis with a comparative study of the algorithms and recommendations for practicing engineers.

The book is appropriate for advanced graduate level courses in numerical control techniques and self study, and intended to serve as a reference book as well.

The book has fifteen chapters, organized into four parts, and includes a CD-ROM containing a MATLAB-based Toolkit, called ”MATCONTROL”, implementing major algorithms of the book.

Chapter 1: Introduction and Review

Chapter 2: A Review of Some Basic Concepts and Results from Theoretical Linear Algebra

Chapter 3: Some Fundamental Tools and Concepts from Numerical Linear Algebra

Chapter 4: Canonical Forms obtained via Orthogonal Transformations

Chapter 5: Linear State-Space Models and Solutions of the State Equations

Chapter 6: Controllability, Observability, and Distance to Uncontrollability

Chapter 7: Stability, Inertia, and Robust Stability

Chapter 8: Numerical Solutions and Conditioning of Lyapunov and Sylvester Equations

Chapter 9: Realization and Subspace Identification

Chapter 10: Feedback Stabilization, Eigenvalue Assignment, and Optimal Control

Chapter 11: Numerical Methods and Conditioning of the Eigenvalue Assignment Problems

Chapter 12: State Estimation : Observer and the Kalman Filter

Chapter 13: Numerical Solutions and Conditioning of Algebraic Riccati Equations

Chapter 14: Internal Balancing and Model Reduction

Chapter 15: Large- Scale Matrix Computations in Control: Krylov Subspace Methods

Appendix A: Some Existing Software for Control Systems Design and Analysis

Appendix B: MATCONTROL and Listing of MATCONTROL Files

Appendix C: Case Study : Control of a 9-State Ammonia Reactor

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