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Nota di contenuto	Fractional Order Motion Controls; Contents; Foreword; Preface; Acknowledgments; Acronyms; PART I FUNDAMENTALS OF FRACTIONAL ORDER CONTROLS; 1 Introduction; 1.1 Fractional Calculus; 1.1.1 Definitions and Properties; 1.1.2 Laplace Transform; 1.1.3 Fractional Order Dynamic Systems; 1.1.4 Stability of LTI Fractional Order Systems; 1.2 Fractional Order Controls; 1.2.1 Why Fractional Order Control?; 1.2.2 Basic Fractional Order Control Actions; 1.2.3 A Historical Review of Fractional Order Controls; 1.3 Fractional Order Motion Controls; 1.4 Contributions; 1.5 Organization PART II FRACTIONAL ORDER VELOCITY CONTROLS2 Fractional Order PI Controller Designs for Velocity Systems; 2.1 Introduction; 2.2 The FOPTD System and Three Controllers Considered; 2.3 Design Specifications; 2.4 Fractional Order PI and [PI] Controller Designs; 2.4.1 Integer Order PID Controller Design; 2.4.2 Fractional Order PI Controller Design; 2.4.3 Fractional Order [PI] Controller Design; 2.5 Simulation; 2.6 Chapter Summary; 3 Tuning Fractional Order PI Controllers for Fractional Order Velocity Systems with Experimental Validation; 3.1 Introduction

3.2 Three Controllers to be Designed and Tuning Specifications3.3 Tuning Three Controllers for FOVS; 3.4 Illustrative Examples and Design Procedure Summaries; 3.4.1 Fractional Order [PI] Controller Design Procedures; 3.4.2 Fractional Order PI Controller Design Procedures; 3.4.3 Integer Order PID Controller Design Procedures; 3.5 Simulation Illustration; 3.5.1 Case-1s Simulation Tests for the Designed FOPI and FO[PI] Controllers with ?c =10 rad/s and fm = 50?; 3.5.2 Case-2s Simulation Tests for the Designed IOPID and FOPI and FO[PI] Controllers with ?c =15 rad/s and fm = 65?
3.6 Experimental Validation3.6.1 Experimental Setup; 3.6.2 HIL Emulation of the FOVS; 3.6.3 Experimental Results; 3.7 Chapter Summary; 4 Relay Feedback Tuning of Robust PID Controllers; 4.1 Introduction; 4.2 Slope Adjustment of the Phase Bode Plot; 4.3 The New PID Controller Design Formulae; 4.4 Phase and Magnitude Measurement via Relay Feedback Tests; 4.5 Illustrative Examples; 4.5.1 High-order Plant P2(s); 4.5.2 Plant with an Integrator P5(s); 4.5.3 Plant with a Time Delay P6(s); 4.5.4 Plant with an Integrator and a Time Delay P7(s); 4.6 Chapter Summary
5 Auto-Tuning of Fractional Order Controllers with Iso-Damping5.1 Introduction; 5.2 FOPI and FO[PI] Controller Design Formulae; 5.2.1 FOPI Controller Auto-Tuning; 5.2.2 FO[PI] Controller Auto-Tuning; 5.3 Measurements for Auto-Tuning; 5.4 Simulation Illustration; 5.4.1 High-Order Plant P2(s); 5.4.2 Plant with an Integrator P5(s); 5.4.3 Plant with a Time Delay P6(s); 5.5 Chapter Summary; PART III FRACTIONAL ORDER POSITION CONTROLS; 6 Fractional Order PD Controller Tuning for Position Systems; 6.1 Introduction; 6.2 Fractional Order PD Controller Design for Position Systems
6.2.1 Integer Order PD Controller Design

Sommario/riassunto

Covering fractional order theory, simulation and experiments, this book explains how fractional order modelling and fractional order controller design compares favourably with traditional velocity and position control systems. The authors systematically compare the two approaches using applied fractional calculus. Stability theory in fractional order controllers design is also analysed. Presents material suitable for a variety of real-world applications, including hard disk drives, vehicular controls, robot control and micropositioners in DNA microarray analysis</