1. Record Nr. UNINA9911018817603321

Autore	Langton Roy
Titolo	Stability and control of aircraft systems : introduction to classical feedback control / / Roy Langton
Pubbl/distr/stampa	Chichester, England ; ; Hoboken, NJ, : Wiley, c2006
ISBN	9786610721177 9780470058480 047005848X 9781280721175 1280721170 9780470058497 0470058498
Descrizione fisica	1 online resource (256 p.)
Collana	Aerospace series
Disciplina	629.132/36
Soggetti	Stability of airplanes Airplanes - Control
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Includes index.
Nota di contenuto	Stability and Control of AircraftSystems; Contents; Series Preface; Preface; 1 Developing the Foundation; 1.1 Engineering Units; 1.1.1 International System of Units (SI); 1.1.2 US/Imperial Units System; 1.1.3 Comparing the SI and US/Imperial Units Systems; 1.2 Block Diagrams; 1.2.1 Examples of Summation (or Comparison) Devices; 1.3 Differential Equations; 1.3.1 Using the 'D' Notation; 1.4 Spring-Mass System Example; 1.4.1 The Standard Form of Second-order System Transfer Function; 1.5 Primer on Complex Numbers; 1.5.1 The Complex Sinusoid; 1.6 Chapter Summary; 2 Closing the Loop 2.1 The Generic Closed Loop System2.1.1 The Simplest Form of Closed Loop System; 2.2 The Concept of Stability; 2.3 Response Testing of Control Systems; 2.4 The Integration Process; 2.5 Hydraulic Servo-actuator Example; 2.6 Calculating Frequency Response; 2.6.1 Frequency Response of a First-order Lag; 2.6.2 Frequency Response of a Second-order System; 2.7 Aircraft Flight Control System Example; 2.7.1 Control System Assumptions; 2.7.2 Open Loop Analysis; 2.7.3

Closed Loop Performance; 2.8 Alternative Graphical Methods for Response Analysis; 2.8.1 The Nyquist Diagram
2.8.2 Deriving Closed Loop Response from Nyquist Diagrams2.8.3 The Nichols Chart; 2.8.4 Graphical Methods - Summary Comments and Suggestions; 2.9 Chapter Summary; 3 Control System Compensation Techniques; 3.1 Control System Requirements; 3.2 Compensation Methods; 3.2.1 Proportional Plus Integral Control; 3.2.2 Proportional Plus Integral Plus Derivative Control; 3.2.3 Lead-Lag Compensation; 3.2.4 Lag-Lead Compensation; 3.2.5 Feedback Compensation; 3.3 Applications of Control Compensation; 3.3.1 Proportional Plus Integral Example; 3.3.2 Lead-Lag Compensation Example
3.3.3 Class 2 System Design Example3.4 Chapter Summary; 4 Introduction to Laplace Transforms; 4.1 An Overview of the Application of Laplace Transforms; 4.2 The Evolution of the Laplace Transform; 4.2.1 Proof of the General Case; 4.3 Applying Laplace Transforms to Linear Systems Analysis; 4.3.1 Partial Fractions; 4.4 Laplace Transforms - Summary of Key Points; 4.5 Root Locus; 4.5.1 Root Locus Construction Rules; 4.5.2 Connecting Root Locus to Conventional Linear Analysis; 4.6 Root Locus Example; 4.7 Chapter Summary; 5 Dealing with Nonlinearities; 5.1 Definition of Nonlinearity Types
5.2 Continuous Nonlinearities5.2.1 Engine Fuel Control System Example; 5.3 Discontinuous Nonlinearities; 5.3.1 Stability Analysis with Discontinuous Nonlinearities; 5.4 The Transport Delay; 5.5 Simulation; 5.6 Chapter Summary; 6 Electronic Controls; 6.1 Analog Electronic Controls; 6.1.1 The Operational Amplifier; 6.1.2 Building Analog Control Algorithms; 6.2 The Digital Computer as a Dynamic Control Element; 6.2.1 Signal Conversion; 6.2.2 Digital Controller Architectures; 6.3 The Stability Impact of Digital Controls; 6.4 Digital Control Design Example; 6.5 Creating Digital Control Algorithms
6.5.1 The Integrator

Sommario/riassunto

In the current climate of increasing complexity and functional integration in all areas of engineering and technology, stability and control are becoming essential ingredients of engineering knowledge. Many of today's products contain multiple engineering technologies, and what were once simple mechanical, hydraulic or pneumatic products now contain integrated electronics and sensors. Control theory reduces these widely varied technical components into their important dynamic characteristics, expressed as transfer functions, from which the subtleties of dynamic behaviours can be analyzed and u