1. Record Nr. UNINA9910136913603321

| | |
|---|---|
| Autore | Chen Wuwei |
| Titolo | Integrated vehicle dynamics and control / / Wuwei Chen [and four others] |
| Pubbl/distr/stampa | Singapore : , : Wiley, , 2016<br>©2016 |
| ISBN | 1-118-38002-9<br>1-118-38000-2<br>1-118-38001-0 |
| Descrizione fisica | 1 online resource (373 p.) |
| Classificazione | TEC009070 |
| Disciplina | 629.04/6 |
| Soggetti | Motor vehicles - Dynamics<br>Motion control devices |
| Lingua di pubblicazione | Inglese |
| Formato | Materiale a stampa |
| Livello bibliografico | Monografia |
| Note generali | Description based upon print version of record. |
| Nota di bibliografia | Includes bibliographical references at the end of each chapters and index. |
| Nota di contenuto | Title Page; Copyright Page; Contents; Preface; Chapter 1 Basic Knowledge of Vehicle System Dynamics; 1.1 Traditional Methods of Formulating Vehicle Dynamics Equations; 1.1.1 Newtonian Mechanics; 1.1.2 Analytical Mechanics; 1.2 Dynamics of Rigid Multibody Systems; 1.2.1 Birth and Development; 1.2.2 Theories and Methods of Multi-Rigid Body System Dynamics; 1.2.3 An Example of the Application of Multi-Rigid Body Dynamics Method in Vehicle System Modeling; 1.3 Flexible Multibody Dynamics; References; Chapter 2 Tyre Dynamics; 2.1 Tyre Models; 2.1.1 Terminology and Concepts; 2.1.2 Tyre Model 2.2 Tyre Longitudinal Mechanical Properties2.2.1 Tyre Rolling Resistance; 2.2.2 Road Resistance; 2.2.3 Tyre Slip Resistance; 2.2.4 Overall Rolling Resistance of the Tyres; 2.2.5 Rolling Resistance Coefficient; 2.3 Vertical Mechanical Properties of Tyres; 2.4 Lateral Mechanical Properties of Tyres; 2.5 Mechanical Properties of Tyres in Combined Conditions; References; Chapter 3 Longitudinal Vehicle Dynamics and Control; 3.1 Longitudinal Vehicle Dynamics Equations; 3.1.1 Longitudinal Force Analysis; 3.1.2 Longitudinal Vehicle Dynamics Equation; 3.2 Driving Resistance; 3.2.1 Aerodynamic Drag |

3.2.2 Ramp Resistance3.2.3 Inertial Resistance; 3.3 Anti-lock Braking System; 3.3.1 Introduction; 3.3.2 Basic Structure and Working Principle; 3.3.3 Design of an Anti-lock Braking System; 3.4 Traction Control System; 3.4.1 Introduction; 3.4.2 Control Techniques of TCS[6]; 3.4.3 TCS Control Strategy; 3.4.4 Traction Control System Modeling and Simulation; 3.5 Vehicle Stability Control; 3.5.1 Basic Principle of VSC; 3.5.2 Structure of a VSC System; 3.5.3 Control Methods to Improve Vehicle Stability; 3.5.4 Selection of the Control Variables; 3.5.5 Control System Structure
3.5.6 The Dynamics Models3.5.7 Setting of the Target Values for the Control Variables; 3.5.8 Calculation of the Nominal Yaw Moment and Control; Appendix; References; Chapter 4 Vertical Vehicle Dynamics and Control; 4.1 Vertical Dynamics Models; 4.1.1 Introduction; 4.1.2 Half-vehicle model; 4.2 Input Models of the Road's Surface; 4.2.1 Frequency-domain Models; 4.2.2 Time Domain Models; 4.3 Design of a Semi-active Suspension System; 4.3.1 Dynamic Model of a Semi-active Suspension System; 4.3.2 Integrated Optimization Design of a Semi-active Suspension System
4.3.3 The Realization of the Integrated Optimization Method 4.3.4 Implementation of the Genetic Algorithm; 4.3.5 LQG Controller Design; 4.3.6 Simulations and Result Analysis; 4.4 Time-lag Problem and its Control of a Semi-active Suspension ; 4.4.1 Causes and Impacts of Time-lag; 4.4.2 Time-lag Variable Structure Control of an MR (Magneto-Rheological) Semi-active Suspension; 4.4.3 Simulation Results and Analysis; 4.4.4 Experiment Validation; 4.5 Design of an Active Suspension System ; 4.5.1 The Dynamic Model of an Active Suspension System; 4.5.2 Design of the Control Scheme

Sommario/riassunto

"A comprehensive overview of integrated vehicle system dynamics exploring the fundamentals and new and emerging developments This book provides a comprehensive coverage of vehicle system dynamics and control, particularly in the area of integrated vehicle dynamics control. The book consists of two parts, (1) development of individual vehicle system dynamic model and control methodology; and (2) development of integrated vehicle dynamic model and control methodology. The first part focuses on investigating vehicle system dynamics and control according to the three directions of vehicle motions, including longitudinal, vertical, and lateral. Corresponding individual control systems, e.g. Anti-lock Brake System (ABS), Active Suspension, Electric Power Steering System (EPS), are introduced and developed respectively. Particular attention is paid in the second part of the book to develop integrated vehicle dynamic control system. Integrated vehicle dynamics control system is an advanced system that coordinates all the chassis control systems and components to improve the overall vehicle performance including safety, comfort, and economy. Integrated vehicle dynamics control has been an important research topic in the area of vehicle dynamics and control over the past two decades. The research topic on integrated vehicle dynamics control is investigated comprehensively and intensively in the book through both theoretical analysis and experimental study. In this part, two types of control architectures, i.e. centralized and multi-layer, have been developed and compared to demonstrate their advantages and disadvantages. Integrated vehicle dynamics control is a hot topic in automotive research; this is one of the few books to address both theory and practice of integrated systems Comprehensively explores the research area of integrated vehicle dynamics and control through both theoretical analysis and experimental study Addresses a full range of vehicle system topics including tyre dynamics, chassis systems, control architecture, 4 wheel steering system and design of

control systems using Linear Matrix Inequality (LMI) Method"--