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A Mathematical Model of a Power Steering System for Implementation in a Driving Simulator - Bong-Choon Jang 1996

Dynamics and Control of an Electric Power Assist Steering System - Prasanth Babu Kandula 2010
In this thesis an Active Disturbance Rejection Controller (ADRC) is applied to Electrical Power Assist Steering (EPAS) system which assists the driver in steering the steering wheel of an automobile. Our control objective is to reduce the steering torque exerted by a driver, so that good steering feel of the driver will be achieved in the presence of external disturbances and system uncertainties which are very common in the EPAS system. The robustness and stability of ADRC controlled EPAS system is investigated through frequency-domain analyses. The Bode diagrams and stability margins demonstrate that the control system is stable during the operation and it is robust against external disturbances and structural uncertainties. In addition, the ADRC is simulated on a column-type EPAS system. The simulation results show that using the proposed ADRC, the driver can turn the steering wheel with the desired steering torque, which is independent of load torques that tend to vary with the change of driving conditions.
Handling Enhancement Due to an Automotive Variable Ratio Electric Power Steering System Using Model Reference Robust Tracking Control - Scott A. Millsap 1995

Hydraulic power steering system design in road vehicles : Analysis, testing and enhanced functionality - Marcus Rösth 2007

Characterisation of an Electrical Power Steering System as Structure Borne Sound Source in Frequency and Time Domain Using Inverse Methods - Michael Hudelmaier 2014

Development of a Mathematical Model of an Automobile Power Steering System - E. F. Schroeder 1968

Steering Handbook - Manfred Harrer 2016-06-24
This edited volume presents basic principles as well as advanced concepts of the computational modeling of steering systems. Moreover, the book includes the components and functionalities of modern steering system, which are presented comprehensively and in a practical way. The book is written by more than 15 leading experts from the automotive industry and its components suppliers. The target audience primarily comprises practicing engineers, developers, researchers as well as graduate students who want to specialize in this field.

Power Steering System with Travelling Condition Judgement Function - K. Nakamura 1989

A New Power Steering System for Tractors - E. H. Fletcher 1961

Robust Control for an Electric Power Steering System - Ke Li 2004

Fault Tolerant Control for an Electric Power Steering System - Matthew Lawson 2009
Electric power steering (EPS) systems are rapidly replacing existing traditional hydraulic power steering systems due to fuel and cost savings. The reliability of a column mounted EPS is improved by adding an alternate control scheme that is tolerant to a torque sensor failure (FTC). To accomplish this, a motor model based observer is used to estimate the total torque on the motor shaft. An independent estimate of the road reaction torque is generated from vehicle navigation signals and subtracted from the total to estimate the torque sensor output. A Hardware-in-the-loop (HIL) simulation is described where the EPS model, road vehicle dynamics and developed control scheme are simulated on an Opal RTTM real-time platform and a physical DC motor is placed in-the-loop. This simulation validates the developed method under more realistic operating conditions than using software simulation alone and is more repeatable and cost effective than a full in-vehicle test.
On Electrohydraulic Pressure Control for Power Steering Applications - Alessandro Dell'Amico 2016-02-04
This thesis deals with the Electrohydraulic Power Steering system for road vehicles, using electronic pressure control valves. With an ever increasing demand for safer vehicles and fewer traffic accidents, steering-related active safety functions are becoming more common in modern vehicles. Future road vehicles will also evolve towards autonomous vehicles, with several safety, environmental and financial benefits. A key component in realising such solutions is active steering. The power steering system was initially developed to ease the driver's workload by assisting in turning the wheels. This is traditionally done through a passive open-centre hydraulic system and heavy trucks must still rely on fluid power, due to the heavy work forces. Since the purpose of the original system is to control the assistive pressure, one way would be to use proportional pressure control valves. Since these are electronically controlled, active steering is possible and with closed-centre, energy efficiency can be significantly improved on. In this work, such a system is analysed in detail with the purpose of investigating the possible use of the system for Boost curve control and position control for autonomous driving. Commercially available valves are investigated since they provide an attractive solution. A model-based approach is adopted,

where simulation of the system is an important tool. Another important tool is hardware-in-the-loop simulation. A test rig of an electrohydraulic power steering system, is developed. This work has shown how proportional pressure control valves can be used for Boost curve control and position control and what implications this has on a system level. As it turns out, the valves add a great deal of time lag and with the high gain from the Boost curve, this creates a control challenge. The problem can be handled by tuning the Boost gain, pressure response and damping and has been effectively shown through simulation and experiments. For position control, there is greater freedom to design the controller to fit the system. The pressure response can be made fast enough for this case and the time lag is much less critical.

Automotive Power Steering System Cooling - 2005

Modelling of a Passenger Vehicle Power Steering System - Darren Besanko 1999

The Evaluation of Drivers Responses to a Multi-characteristic Power Assisted Steering System - 1906

A sample of fifty male and fifty female drivers took part in an:. experiment designed to evaluate a multi-characteristic power assisted steering system. Subjects drove a car fitted with the system for two one-hour periods on public roads and on two test-track sessions during which a number of driving performance variables including driving time and steering activity were recorded. Drivers completed a specially developed questionnaire after each road drive. A subsidiary task, which involved the visual monitoring of an illuminated display and verbal responses, was administered during the test-track sessions. Factor analysis and discriminant analysis were used to analyse data from the questionnaire, road drives and test- track sessions. Data were first factor analysed and the factors subsequently used as variables in the discriminant analyses. It was possible to discriminate between male and female drivers, and between groups of drivers allocated to the different power steering characteristics on the basis of the discriminant functions derived. Thus, reales were found to be more sensitive to the force feedback characteristics of the standard power steering than females, finding it difficult to judge the amount of effort required to steer the car and tending to 'over steer' under some circumstances. Males drove faster than the females on the Motorway with the standard power steering, however, more slowly than females in urban driving, and drove faster and more accurately than females on the test-track. On the basis of the differences observed between drivers allocated to the different power steering characteristics, criteria were developed which allowed the specification of that characteristic which could be considerec 'optimal' for ordinary drivers of both sexes. This character- istic, termed "Speed Proportional Feel", provides the driver with full power assistance at low speeds, but increasingly inhibits the operation of the power assistance as vehicle speeds rise, gi.

An Investigation of the Performance of a Power Steering System for Passenger Cars - Fatmir Gutaj 2001

Model for Simulation of Power Steering System in MBS - 1999

An Investigation of Noise and Vibration in an Automotive Power Steering System - Chuan-Chiang Chen 2001

Electric Steering - Daniel J Holt 2001-12-01

This report profiles the development and unlimited potential of electric steering technology--an innovation expected to fundamentally change the way automobiles are designed, produced, and marketed. Electric Steering offers information on how this revolutionary steering system evolved, and the effects its implementation will have on America's largest manufacturing industry. Chapters include: Steering Basics Electronic Steering The Market Drivers The Future and more

Non-integrated Power Steering System - 1977

Electrical Power Steering System for Automated Driving - Takashi Iwasaki 1997

Investigation of a Hydraulic Power-steering System - Bernard Alvin Kriegsman 1952

Study of Vibration in Hydraulic Power Assisted Steering System - Hamaznoor Nizam Hassan Basri 2007

Modeling and Analysis of a Hydraulic Power Steering System for Use in Vehicle Simulation - Loren Jay Stowe 1999

Development of an Electronically-controlled Power Steering System - H. Yamaguchi 1984

Optimal Control for Electrical Power-assisted Steering System - Xiaoqun Chen 2005

Active Torque Control of Electric Power Steering System Using Composite Nonlinear Feedback Control - Nai Ho Ling 2015

Hornig's "direct Power" Steering System - E.S. Wells 1899*

Modeling, Analysis, and Control of Electric Power Steering (EPS) System of an Intelligent Vehicle - Elie Ayoub 2015

Automotive Steering and Suspension - Kershaw 2017-05-05

Automotive Steering and Suspension, published as part of the CDX Master Automotive Technician Series, arms students with the basic knowledge and skills they need to accomplish a variety of tasks in the shop. Taking a “strategy-based diagnostics” approach, this book helps students master technical trouble-shooting in order to address the problem correctly on the first attempt.

An Electric Power Steering System for Vehicles with Controlled Input to the Steering - Matthew John Blank 1992

Improving Steering Feel in Electric Power Steering Systems - Jose Velazquez Alcantar 2014

The introduction of electric power steering (EPS) systems has allowed automotive OEM's to increase fuel efficiency and develop a myriad of driver assist functions such as park assist and active lane keeping. However, one of the biggest complaints about EPS systems is the lack of good steering "feel". This paper introduces a model reference feedback control system aimed at improving steering feel. Detailed nonlinear models of column-mounted and rack-mounted EPS systems are derived using bond graphs to analyze the dynamics of the system. Reduced order linear model of the EPS systems are then derived for control development. A torque

feedback controller is developed that allows engineers to quickly and easily tune the "feel" of the steering system via four tuning parameters on a reference model. A return-to-center controller is also developed to center the steering wheel whenever the driver releases it from an off center position. The two control systems are integrated together using fuzzy logic so as to determine when to use the return-to-center controller. It is shown through simulation studies that the final control system gives great tracking performance and that the use of fuzzy inference system allows the controllers to switch smoothly and appropriately thus showing potential to improve steering feel.
Power-assisted Steering System - Bedford ERV & HRX - Vauxhall Motors Ltd 1971

Bishop VARIATRONIC Power Steering System - J. Baxter 1988

A Comparative Study of Power Consumption of Electric Power Steering System - Mohd Khair Hassan 2012

Lateral Stability of a Vehicle Equipped with a Hydraulic Power Steering System - Wendell Smith Norman 1961

Communication Systems and Information Technology - Ming Ma 2011-06-21
This volume includes extended and revised versions of a set of selected papers from the International Conference on Electric and Electronics (EEIC 2011) , held on June 20-22 , 2011, which is jointly organized by Nanchang University, Springer, and IEEE IAS Nanchang Chapter. The objective of EEIC 2011 Volume 4 is to provide a major interdisciplinary forum for the presentation of new approaches from Communication Systems and Information Technology, to foster integration of the latest developments in scientific research. 137 related topic papers were selected into this volume. All the papers were reviewed by 2 program committee members and selected by the volume editor Prof. Ming Ma. We hope every participant can have a good opportunity to exchange their research ideas and results and to discuss the state of the art in the areas of the Communication Systems and Information Technology.
The Design Concept of an Integral Power Steering System for Heavy Duty Trucks - K. Okamoto 1977

Robust Control Design of Electric Power Steering Systems - Ahmed Hamdy EI-Shaer 2008

Design of an Electric Power Steering System Using a Model Reference Approach and Additional Column Or Rack Actuators - Alex K. Beckerman 2014
Electric power steering (EPS) systems have been adopted by the automotive industry principally because of potential fuel savings over the more conventional hydraulic power steering. EPS lends itself to improvements in automobile steering feel and vehicle response as well as ultimately leading to steer-by-wire systems. This thesis proposes two adaptations of the standard column mounted electric power steering (C-EPS) system. In the first new configuration, an additional motor is placed between the C-EPS motor and the steering wheel for independent control of steering feel. In the second new configuration, an additional motor is placed between the rack and right tie rod for independent control of vehicle response. These new motors, combined with a model reference approach utilizing Proportional-Integral-Derivative (PID) control and linear quadratic regulator (LQR) control, allow for the independent tuning of desired steering feel and vehicle response, leading to new or improved functionality when compared to more traditional EPS systems: disturbance rejection, yaw damping, variable steering ratio, and increased linear tire behavior. Without additional motors, it can still be shown that the model reference approach is advantageous for various traditional EPS functions: assist, return to center, and inertia compensation. These new or improved functions are tested under various conditions with various inputs and compared to a more traditional EPS system.