A new control strategy of an electric-power-assisted steering system

What are the objectives of a steering wheel control?
The control objectives are to generate assist torque with fast responses to driver's torque commands, ensure system stability, attenuate vibrations, transmit the road information to the driver, and improve the steering wheel returnability and free-control performance. The control must also be robust to modeling errors and parameter uncertainties.

Which control theory is used in electric power steering system?
So,various control theories have been used in the electric power steering system. Classical control theorywas applied to the electric power steering system. Yin Chunfang et al. 2 proposed the flexible PID control method with good real-time tracking ability.

Why is the control of electric-power-assisted steering a challenging problem?
Abstract: The control of electric-power-assisted steering (EPAS) systems is a challenging problem due to multiple objectives and the need for several pieces of information to implement the control.

What is electric power steering system (EPS)?
The electric power steering system (EPS) is playing an increasingly important part with the development of the smart driving and unmanned driving of cars. 1 EPS is characterized in energy saving,light weight and being easy to control.

How do you adjust the steering feel of an electric power steering system?
The steering feel is mostly indirectly adjusted by directly modifying the assist's magnitudeof the electric power steering system. The adjustment is complex,and workload is large,and the steering feel is highly dependent on the performance of the hardware.

What are the problems of electric power steering system?
In: IEEE/CSAA international conference on aircraft utility systems (AUS),Beijing,China,10-12 October 2016. In terms of the research on electric power steering system,there are some problems,such as model uncertain and external interference. However,it is difficult for a general controller to deal wit...

Abstract. Drivers are sensitive to steering feel of a vehicle and significant tuning efforts are placed to set the desired steering feel. This paper discusses a closed-loop torque overlay control system to improve the steering feel of an electric power-assisted steering (EPAS) system. This system has reference model, rack force estimator, and tracking controller. A ...

The control of electric-power-assisted steering systems is a challenging problem due to multiple objectives and the need for several pieces of information to implement the control, but the proposed strategy improves

system performance and robustness and reduces costs.

The control objectives are to generate assist torque with fast responses to driver"s torque commands, ensure system stability, attenuate vibrations, transmit the road information to the driver, and improve the steering wheel returnability and free-control performance.

A novel control strategy for an electric power assisted steering system that would help in reducing the undesirable vibration and the driver effort in both the parking and driving ...

Firstly, take the driver"s desired steering motion intensity and pinion angle position as intermediate variables to decompose the EPS control strategy into three parts: steering ...

A. Marouf, M. Djemai, C. Sentouh, and P. Pudlo, "A new control strategy of an electric-power-assisted steering system," IEEE ... M. Djemai, and P. Pudlo, "Control of electric power assisted steering system using sliding mode control," in Proceedings of the 14th International IEEE Conference on Intelligent Transportation Systems (ITSC ...

Abstract: Terrain conditions of road are a determining factor for the driver"s feel of driving. But, power steering is a boon to all the drivers of all classes of vehicles. This paper presents a novel control strategy for an electric power assisted steering system that would help in reducing the undesirable vibration and the driver effort in both the parking and driving state of the vehicle.

This paper presents a new control strategy for an Electric Power Steering system. Due to higher steering assist gain and non linear torque map, which reduces stability and causes vibrations in steering system, an stabilizing compensator should be ...

Hu et al. 7 proposed a logical method controlled by power, damping, return and inertia and achieved compensation through the control logic that included the vehicle speed and corner signals to optimize the steering ...

The main focus of this paper is to review the most recent trends in the various control methodologies for the Electric power assist Steering (EPAS) ECU. It covers the various aspects of design, modeling, simulation, analysis and control. The EPAS controller drives the electric motor to provide the assist torque. Stability compensators are used to attenuate the torque ripples ...

Electric power steering (EPS) is more and more in use for passenger cars. Compared with hydraulic steering systems there are many advantages, such as reduced CO2 emissions and the possibility to use the EPS motor torque for advanced driver assistance systems. One task of the steering system is to give the driver an adequate steering feel. This ...

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A simplified model of the augmented steering assembly-electric motor system is developed using Lagrangian dynamics, and an optimal controller structure for the model is proposed, and a control strategy that eliminates the steering column torque sensor is presented. This paper considers the analysis and design of a double-pinion-type electric power assist ...

A novel electric power steering system (EPS) integrated with active front steering (AFS) is developed. It has functions of both AFS system and EPS system with two actuator units: the AFS actuator unit and the EPS actuator unit. The AFS actuator unit controls the displacement transfer behavior of the steering system, and improves the handling stability under adverse ...

1. Introduction. EPS system is a kind of power steering system is which widely used in the field of vehicles; the system helps the driver to complete the steering movement by providing appropriate power and controlling the motor through the electronic control unit, in order to improve the steering performance of the vehicle.

Electric Power Steering system (EPS) has been widely used in passenger cars. 1 Compared to hydraulic power steering systems, EPS has the advantages of good steering following performance and low energy consumption. 2 The EPS control strategy directly determines the effectiveness of assistance. However, many uncertain factors in the actual driving process of ...

This paper presents a novel control strategy for an electric power assisted steering system that would help in reducing the undesirable vibration and the driver effort in both the parking and ...

Fig. 1. EPAS Dynamic model sions. II. SYSTEM MODELING A. Dynamic Model of EPAS System The dynamic model of the EPAS system establishes re-lation between steering mechanism, electric dynamics of

A New Control Strategy of an Electric-Power-Assisted Steering System. The control of electric-power-assisted steering (EPAS) systems is a challenging problem due to multiple objectives and the need for several pieces of information to implement the control. ... The control objectives are to generate assist torque with fast responses to driver"s ...

This paper presents a new control strategy of Electric Power Assisted Steering (EPAS) systems to ensure several control objectives. First, a reference model is employed to generate ideal motor angle that can guarantee the control objectives, assist torque generation, fast response to driver"s torque command, vibration attenuation, supplying road information to the driver, improving ...

24-26 In order to solve the contradiction between lightness and "flexibility" of electric power steering system, The assist characteristics curve should be matched to the specific vehicle parameters and driver requirements

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...

The electric power steering (EPS) system is a steering system supported by motors, which offers drivers lighter steering experience. ... Apkarian et al. proposed a new structured H ? comprehensive control method ... It is the dead zone that causes the nonlinearity of the system. In the parking state, the driver needs a larger assist torque, ...

The electric power steering system is used to improve comfort and steering feel for the user. ... Marouf A, Djemai M, Sentouh C, et al. (2012) A new control strategy of an electric-power-assisted steering system. IEEE ... Karimi HR, et al. (2015) Fuzzy control for electric power steering system with assist motor current input constraints ...

A robust control design of Electric Power Assisted Steering (EPAS) system is presented using integral sliding mode control to ensure the control objectives, such as the steering assist torque generation, the dampening compensation and the robustness to the parameters uncertainty, modeling errors, nonlinearity and disturbances. This paper presents a ...

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2011 50th IEEE Conference on Decision and Control and European Control Conference (CDC-ECC) Orlando, FL, USA, December 12-15, 2011 Control of an Electric Power Assisted Steering System Using Reference Model A. Marouf, C. Sentouh, M. Djemaï and P. Pudlo Abstract-- This paper presents a new control strategy of Electric Power Assisted Steering (EPAS) systems to ...

Keywords: automotive control, electric power steering, linear observer, robust control 1. INTRODUCTION Interactions between driver and vehicle mainly go through a steering system. Manual steering involves heavy or low-geared steering. Hence, power-assisted steering systems have been introduced to overcome those issues. They help

An electric power steering (EPS) system has the advantages of safety, energy saving, and comfortable steering, which has gradually replaced mechanical and hydraulic power systems to achieve assist power steering function in the steering system [2 - 4]. However, the EPS system also causes some issues.

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