1

Combined wheel torque and steering control based on model predictive controller using a simplified tyre model [Texto impreso]/ Ganesh Adireddy, Taehyun Shim, Douglas Rhode, Jahan Asgari

Este artículo se encuentra disponible en su edición impresa. Los datos para su localización están accesibles a través del enlace al título de la publicación.

References: p. 50 : 18 refs.

This paper presents a vehicle chassis control system based on a model predictive control method that controls both front steer and wheel torques at each wheel and is developed to enhance vehicle yaw motion and the ability to track the desired trajectory. A computationally efficient simplified non-linear tyre model, which is easy to implement in the control algorithms, is used along with an 8 degree of freedom (DOF) vehicle model. The performance of this controller is compared to that based on the well known Magic Formula tyre model. The effectiveness and limitations of the proposed controller are discussed through simulation.

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1. MPC 2. Model predictive control 3. Simplified tyre 4. Vehicle dynamics control

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2

Determinants of US passenger car weight [Texto impreso] / Donald MacKenzie, Stephen Zoepf, John Heywood

Este artículo se encuentra disponible en su edición impresa. Los datos para su localización están accesibles a través del enlace al título de la publicación.

References: p. 92-93 : 18 refs.

After a precipitous drop from 1976-1982, the weight of US passenger cars has grown steadily. This article examines multiple conflicting influences on vehicle weight in two categories: technological changes that reduce vehicle weight and improvements in functionality that, ceteris paribus, add to vehicle weight. The widespread adoption of unibody construction, lightweight materials and smaller engines has been offset by growth in vehicle size and feature content. The best estimates from this work indicate that new features and functionality would have added at least 250 kg (550 lbs) to the weight of the average new car between 1975 and 2009, if not for offsetting improvements in technology. Over the same period, it is estimated that alternative materials, more weight-efficient vehicle architectures and reduced engine sizes have taken 790 kg (1700 lbs) out of the weight of the average car. These observable influences do not explain the full extent of the drop and subsequent growth in weight, suggesting that substantial non-observed technological improvements were made from 1976-1982 and that unobserved improvements in areas such as crashworthiness and NVH have added substantially to vehicle weight in the past two decades.

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1. Features 2. Materials 3. Passenger vehicles 4. Unibody 5. Weight

3

Kineto-dynamic directional response analysis of an articulated frame steer vehicle [Texto impreso] / Alireza Pazooki, Subhash Rakheja, Dongpu Cao

Este artículo se encuentra disponible en su edición impresa. Los datos para su localización están accesibles a través del enlace al título de la publicación.

References: p. 29-30 : 23 refs.

Owing to their high mass centre, relatively soft tyres, extreme variations in the load and load distributions during work cycles and greater flexibility of the steering system, the articulated steer vehicles (ASV) exhibit lower directional stability limits compared to vehicles with conventional steering. In this study, a kineto-dynamic model of the frame steering mechanism is formulated in conjunction with a nonlinear yaw-plane model of an articulated dump-truck. The validity of the model is demonstrated based on the available measured data. The proposed model is initially analysed to derive response characteristics of the steering system in terms of articulation angle, valve opening, strut orientations and deflections, fluid pressures and resultant strut forces and torque. The influences of variations in selected operating and design parameters on the steering system responses are investigated under a steady-turning and pulse steering inputs. The results provide important design guidelines with regard to kinematic and dynamic parameters of the steering mechanism and show that the lateral stability of the ASV is strongly influenced by the effective damping of the steering mechanism which is determined by kineto-dynamic characteristics of the articulated steering system including leakage flows across the struts piston, valve flow characteristics and struts orientations.

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1. ASVs 2. Articulated steer vehicles 3. Frame steering mechanism 4. Kinetodynamic model 5. Directional stability 6. Model validation 7. Design guidance 8. Vehicle design

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4

Structure and performance of a novel electric power steering system integrated with active steering [Texto impreso] / Jianwei Wei, Minxiang Wei

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References: p. 111-112 : 20 refs.

Based on the review of the primary functions, as well as defects of the existing electric power steering (EPS) and active steering respectively, a realization of active steering on existing EPS system is researched and a novel EPS system integrated with active steering is introduced. According to the working principle of double planetary gear train, decoupling control of force and angular displacement is realised. To study the effects of the proposed novel EPS system on vehicle's steering performance, mathematical models are built and then amplitude-frequency characters of steering feeling and steering sensitivity, as well as stability are investigated. Results indicate that road information can be measured by the torque sensor without any installation position changing, compared with that of existing EPS system and no other torque sensor is needed. Meanwhile, perfect combination of force and angular displacement can be obtained by the novel EPS system

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1. Active steering 2. Electric power steering 3. Steering feeling 4. Steering information 5. Steering sensitivity

5

Suspension design by means of numerical sensitivity analysis and optimisation [Texto impreso] / Bernhard Angrosch, Manfred Plöchl, Werner Reinalter

Este artículo se encuentra disponible en su edición impresa. Los datos para su localización están accesibles a través del enlace al título de la publicación.

References: p. 71-72 : 26 refs.

The kinematic layout of suspension systems determines the wheel's motion during bounce and rebound and thus, has a high influence on the dynamic performance of the vehicle. The presented study uses design of experiments (DoE) to determine dependencies between the location of the mounting points of the suspension devices and typical suspension indicators. Therefore, MBS models of a McPherson front as well as a multi-link rear suspension are considered. Then the locations of the mountings are varied by means of numerical optimisation by considering target values for chosen suspension indicators. While vehicle handling properties are usually anticipated by regarding suspension indicators, this paper aims to present a shortcut between the positioning of a suspension's mounting points and the resulting consequences on the vehicle handling characteristics by means of DoE. Therefore, a virtual full vehicle model is introduced.

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1. DoE 2. Design of experiments 3. McPherson suspension 4. Multi-link suspension 5. Numerical optimisation 6. Suspension design 7. Design guidance 8. Vehicle design