1
Aerodynamic design and development of the Sunswift IV solar racing car [Texto impreso] / Graham Doig, Chris Beves

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. 165-166 : 20 refs.

The aerodynamic design and development of the University of New South Wales' ultra-low-drag solar-electric Sunswift IV car is described, detailing the student-led design process from initial concept sketches to the completed vehicle. The body shape was established and refined over a period of six months in 2008-2009, almost entirely using computational fluid dynamics. The guiding philosophy was that predictable handling and drag minimisation in challenging, changing wind conditions of the type commonly seen during the World Solar Challenge across Australia was preferable to high performance only on 'perfect' days. The car won its class in the 2009 and 2011 World Solar Challenges, and holds the Guinness World Record for fastest solar-powered vehicle.

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1. Aerodynamics 2. CFD 3. Computational fluid dynamics 4. Ground effect 5. Land speed record 6. Renewable energy 7. Solar car 8. Streamlining 9. Vehicle design 10. World solar challenge

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2
A comparison of alternative strategies for optimal utilisation of tyre friction forces aimed at vehicle lateral-plane motion control [Texto impreso] / Javad Ahmadi, Ali Khaki-Sedigh

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. 190-191 : 17 refs.

In this paper, three strategies are analysed and compared for optimal determination of tyre friction forces used for vehicle lateral-plane motion control. The valueability of this determination depends on the feasibility of the solution of a real-time optimisation problem. In strategy (III), the optimisation problem is relaxed from the equality constraints (enforced in strategies (I) and (II)) posed owing to the stabilisation and tracking objectives of the closed loop and instead these objectives are included in the cost function of the optimisation problem. In this way, the problem of the existence of feasible solution encountered in strategy (II) is remedied without infringing the saturation restrictions imposed by the limited physical capability of the tyres and actuators in developing tyre friction forces, which was overlooked in strategy (I). Detailed simulation studies show convincing performance that can be achieved with strategy (III) in physical entire range of operation including mild, moderate and severe manoeuvre conditions.

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1. Feasible solution 2. Optimal tyre friction forces 3. Over-actuation 4. Saturation 5. Severe manoeuvre 6. Vehicle lateral-plane motion control

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3
Component sensitivity analysis of conceptual vehicle body for lightweight design under static and dynamic stiffness demands [Texto impreso] / Wei Chen, Wenjie Zuo

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. 121-122 : 15 refs.

At conceptual design stage, engineers mostly rely on their experience, intuition, and data accumulation when making decisions on conceptual vehicle body (CVB). This paper presents a component sensitivity method for the lightweight design of the CVB. Firstly, CVB is simplified as a frame structure consisting of box beams. Secondly, torsional stiffness, bending stiffness and frequencies are adopted to evaluate the global stiffness performances of the CVB frame. Thirdly, component sensitivity formulas are derived. Fourthly, two application

examples of car and bus frame verify that the proposed method is efficient to guide the cross-sectional sizes modification. The sufficient condition to obtain positive frequency sensitivity is also discussed. And finally Vehicle Body-FDO software is released for free to implement this method.

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1. Box beam 2. Conceptual vehicle body 3. CVB 4. Frequency 5. Lightweight 6. Sensitivity analysis 7. Structural components 8. Torsional stiffness 9. Vehicle design

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4

Evaluation of driver steering preferences using an automotive simulator [Texto impreso] / Jesse Black ... [et al.]

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. 141-142 : 15 refs.

A high fidelity steering simulator was developed and validated to support driver steering preference studies. The steering simulator was validated using in-vehicle test data and two pilot studies before application to a demographics-based driver preference study with 43 subjects. This latter study reflected the following trends: drivers who used their vehicles for utility purposes preferred faster steering ratios and heavier steering torque in residential, country, and highway environments. In contrast, car enthusiasts preferred fast steering ratios in residential and country environments and light steering torque on the highway. These relationships may be used to set steering targets, during future vehicle developments, to accurately match vehicles to their intended market segments.

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1. Automotive simulator 2. Assessment 3. Driver preferences 4. Hardware-in-the-loop testing 5. Human subject testing 6. Steer-by-wire 7. Steering ratios 8. Steering systems 9. Steering torques 10. Vehicle dynamics

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5

Optimisation of geometry and material properties of a non-pneumatic tyre for reducing rolling resistance [Texto impreso] / Mallikarjun Veeramurthy, Jaehyung Ju, Lonny L. Thompson, Joshua D. Summers

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. 214 : 13 refs.

The effect of geometric and material parameters of a non-pneumatic tyre (NPT) on overall performance of the NPT is investigated. Parametric studies, design of experiments (DOE), and sensitivity analyses are conducted with a hyper-viscoelastic finite element model to determine effects of design variables: i) the thickness of spokes; ii) the shear band thickness and iii) shear modulus of polyurethane (PU), on rolling resistance, vertical stiffness, and contact pressure. A response surface model is generated from DOE and is used to find optimum design values for minimising rolling resistance of an NPT under constraints on vertical deflection and contact pressure. Shear modulus of PU and the shear band thickness are the most important design parameters to affect rolling resistance, vertical stiffness, and contact pressure. The optimised values show that the NPT has low rolling resistance with a higher shear modulus of PU and a higher shear band thickness associated with a lower shear deformation while rolling.

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1. DOE 2. Design o experiments 3. Hyperelastic 4. Non-pneumatic tyre 5. NPT 6. Optimisation 7. Rolling resistance 8. Viscoleastic