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An extended Luenberger observer for estimation of vehicle sideslip angle and road friction [Texto impreso] / Nenggen Ding, Wen Chen, Yipeng Zhang, Guoyan Xu, Feng Gao

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. 413-414 : 31 refs.

An extended Luenberger observer for estimating vehicle sideslip angle and road-friction coefficient is proposed in this paper. The observer is designed based on local linearisation and the Routh-Hurwitz criterion. The vehicle is described by a simple nonlinear bicycle model and the road friction is manifested by a random-walk model. It is explicitly proved that road friction will be completely unobservable if all of the tyres operate in the linear range and observability of the vehicle sideslip angle will greatly deteriorate and even get lost when all the tyre forces are saturated. A gain-schedule strategy is proposed for estimation of road friction when the tyres operate in a transition state between linear range and lateral force saturation. The effectiveness and robustness of the proposed observer are evaluated in a simulation environment using a high-fidelity vehicle dynamics. The simulation results clearly verify that the proposed observer-based methodology has sufficient accuracy for estimation and strong robustness to parameter variation.

International Journal of Vehicle Design. -- 2014, v. 66, n. 4, p. 385-414

1. Extended Luenberger observer 2. Observability 3. Road-friction coefficient 4. Sideslip angle

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2

An inverse mapping capability for designing blast resistant composite panels through multi-scale modelling [Texto impreso] / John P. Kim, Nickolas Vlahopoulos

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. 383-384 : 29 refs.

This paper presents the development of a multi-scale simulation process for modelling the response of a composite panel to blast loads from an explosive threat. The new process can be used for improving the blast resistant capabilities of the composite panel by configuring its properties at the microlevel. A multi-scale simulation process using the coupled MAC/GMC and ABAQUS explicit codes for computing the response of a structure subjected to a load from an explosion has been established. The functionality of this multiscale simulation capability and the efforts in incorporating microconstitutive material behaviour at high strain rate loading in the simulation process are presented. Formulating an inverse mapping capability for linking desired material properties with the composition of their micro structure in MAC/GMC in a computationally efficient manner, and conducting an optimisation analysis for identifying the desirable material properties for increasing the blast resistant characteristics are presented.

International Journal of Vehicle Design. -- 2014, v. 66, n. 4, p. 363-384

1. Blast event simulation 2. Composite panel 3. Finite element analysis 4. Inverse mapping 5. Light weight vehicles 6. Multi-scale modelling

3
Modelling of road profiles using roughness indicators [Texto impreso] / Pär Johannesson, Igor Rychlik

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. 340-341 : 31 refs.

The vertical road input is the most important load for durability assessments of vehicles. We focus on stochastic modelling of the road profile with the aim to find a simple but still useful model. The proposed nonstationary Laplace model with ISO spectrum has only two parameters, and can be efficiently estimated from a sequence of roughness indicators, such as IRI or ISO roughness coefficient. Thus, a road profile can be stochastically reconstructed from roughness indicators. Further, explicit approximations for the fatigue damage due to Laplace roads are developed. The usefulness of the proposed Laplace-ISO model is validated for eight measured road profiles.

International Journal of Vehicle Design. -- 2014, v. 66, n. 4, p. 317-346

1. Durability assessment 2. Fatigue damage 3. International roughness index 4. IRI 5. ISO spectrum 6. Laplace process 7. Non-Gaussian process 8. Power spectral density 9. PSD 10. Road irregularity 11. Road profiles 12. Road roughness coefficient 13. Road surface profiles 14. Roughness indicators 15. Stochastic modelling 16. Vehicle durability

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4
A response-surface-based tool for vehicle front-end design for pedestrian impact protection using human body model [Texto impreso]/ Bingbing Nie, Yong Xia, Qing Zhou, Jun Huang, Bing Deng, Mark Neal

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. 359-362 : 45 refs.

This study introduces a response-surface-based design tool of vehicle front-end for pedestrian lower limb impact protection performance. Using a simplified parametric vehicle front-end model, a pedestrian human body model (HBM) and impact simulations, a design of experiment (DOE) study is conducted, and based on the results, response surfaces for lower limb injury predictions have been generated. The Latin Hypercube sampling scheme is used to create the models of the front structure of a variety of vehicles, and reasonable geometry and stiffness variables are included. The response surfaces have been implemented in a graphical user interface (GUI) to provide simple and intuitive feedback on human lower limb injury predictions as the vehicle front-end design changes.

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1. Design of experiment 2. DOE 3. Global sensitivity analisys 4. Graphical user interface 5. GUI 6. HBM 7. Human body model 8. Parametric vehicle model 9. Pedestrian lower limb injury 10. Response surface 11. Vehicle front-end design