1

Analysis of the torsional rigidity of a dump semi-trailer under unfavourable load conditions [Texto impreso] / David Valladares, Marco Carrera, Ramon Miralbes, Luis Castejon

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. 323-324 : 17 refs.

The tipping operation of a dump semi-trailer increases the vehicle rollover risk. A higher centre of gravity, a transversal slope, varying compression degrees of the ground or an irregular unloading can lead to non-desirable lateral instability situations. Therefore it is interesting to analyse the torsional rigidity of the semi-trailer dump bed under unfavourable load conditions generating torsional compliance.
By means of detailed finite element models, it has been possible to verify the correct performance of the articulated coupling between the semi-trailer dump bed and the hydraulic actuator in the presence of any unfavourable stability conditions that could occur.

International Journal of Vehicle Design. -- 2014, v. 64, n. 2-4, p. 304-324

1. Coupling 2. Dump 3. FEM 4. Instability 5. Off-centre load 6. Rollover 7. Safety 8. Semi-trailer 9. Torsional rigidity 10. Transport 11. Unloading

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2

Effects of steering dynamics upon tyre lateral forces on deformable surfaces [Texto impreso] / Jaroslaw Pytka

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. 193-194 : 22 refs.

Tyre lateral force is one of the most important parameters of the tyre and is critical for vehicles handling and stability performance. For wheeled off-road vehicles, the effects of deformable surface on tyre performance must be considered. This paper presents a study on tyre lateral force measurement on three different deformable surfaces: loess soil, sandy soil and wet snow. The lateral force was measured on two front wheels of a light SUV by means of two 6-element Rotating Wheel Dynamometers (RWDs). The front wheels of the vehicle were turned by a steering robot installed in the vehicle to obtain repeatable excitation of the wheels at various angular speeds (100, 500 and 1500 deg/s) and frequencies (0.5, 1 and 2.5 Hz). During measurements, the test vehicle was pulled by a tractor vehicle of a significantly higher weight to ensure linear movement. This paper presents and discusses the tyre lateral force results and characteristics.

International Journal of Vehicle Design. -- 2014, v. 64, n. 2-4, p. 170-194

1. Measurements 2. Off-road vehicles 3. Steering 4. Tyre lateral force 5. Tyre-snow interaction 6. Tyre-soil interaction

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3

Experimental analysis and control development for vehicle rollover prevention [Texto impreso] / Shawky Hegazy, Corina Sandu

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. 369-370 : 28 refs.

A theoretical study of the vehicle design parameters affecting the vehicle stability was investigated. The vehicle speed and the rate of change of the steering angle are the most significant parameters that affect the vehicle stability. An experimental test rig simulating the mechanical steering system was designed and constructed, and a control algorithm was developed. At a threshold value, a control signal was activated automatically to control the vehicle speed and lock the steering wheel in the critical direction. Accordingly, controlling the lateral acceleration may prevent the vehicle rollover at critical speeds and thus it may improve the vehicle stability.

International Journal of Vehicle Design. -- 2014, v. 64, n. 2-4, p. 347-371

1. Active control 2. Rollover 3. Tyre model 4. Vehicle stability

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4

A fatigue failure formula and a new measure of the roughness of a terrain profile [Texto impreso] / T. C. Sun, D. Gorsich, M. Chaika, Jinfeng Wei, S. Qiu, K. Alyass

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. 135-136 : 8 refs.

There have been complaints that the root mean square (RMS) does not describe the roughness of terrain profiles well. Similar complaints can be made about the international roughness index (IRI) as a measurement of roughness of terrain profiles. In this paper, by using the rainflow count of the oscillations of the terrain profiles, we shall first propose a fatigue failure formula and then we shall modify it to define a new measure of roughness of terrain profiles. We shall show that this new measure can describe the roughness better than the RMS and the IRI and hence, can be used, either independently or in conjunction with RMS and IRI, as a new measure of roughness of terrain profiles.

International Journal of Vehicle Design. -- 2014, v. 64, n. 2-4, p. 121-136

1. Terrain modelling 2. Terrain roughness

5

Gas damper [Texto impreso] : potential vehicle performance studied on a full-car model / Jorge G. Prada, Jordi Vinolas, Xabier Carrera

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. 237-239 : 33 refs.

The Gas Damper (GD) uses gas as internal fluid, obtaining an important dependency on operating frequency and stroke amplitude. The potential performance of GD was analysed previously using a quarter-car model, and offered a new approach to the traditional ride/handling trade-off, especially in off-road vehicles. This paper studies the GD influence on a vehicle's performance using a more complete model (full-car) to confirm its suitability for that kind of vehicle and also to completely understand the GD behaviour. This is evaluated by assessing ride isolation, road-holding, body control and rollover stability, and is compared to the performance of a hydraulic suspension.

International Journal of Vehicle Design. -- 2014, v. 64, n. 2-4, p. 214-239

1. Gas damper 2. GD 3. Handling 4. Off-road vehicle dynamics 5. Ride comfort 6. Roll stability 7. Suspension design 8. Suspension system 9. Vehicle performance 10. Vibration control

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6

A general model for inferring terrain surface roughness as a root-mean-square to predict vehicle off-road ride quality [Texto impreso] / Phillip J. Durst, Alex Baylot, Burney McKinley, George L. Mason

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. 152 : 15 refs.

There have been complaints that the root mean square (RMS) does not describe the roughness of terrain profiles well. Similar complaints can be made about the international roughness index (IRI) as a measurement of roughness of terrain profiles. In this paper, by using the rainflow count of the oscillations of the terrain profiles, we shall first propose a fatigue failure formula and then we shall modify it to define a new measure of roughness of terrain profiles. We shall show that this new measure can describe the roughness better than the RMS and the IRI and hence, can be used, either independently or in conjunction with RMS and IRI, as a new measure of roughness of terrain profiles.

International Journal of Vehicle Design. -- 2014, v. 64, n. 2-4, p. 137-152

1. FD 2. Fractal dimension 3. Military vehicles 4. Off-road performance 5. Power spectral density 6. PSD 7. Ride performance 8. RMS 9. Root-mean-square 10. Surface roughness 11. Terrain characterisation 12. Terrain modelling

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7

Mathematical models for farm tractor rollover prediction [Texto impreso] / Giorgio Previati, Massimiliano Gobbi, Giampiero Mastinu

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. 299-300 : 25 refs.

This paper deals with the estimation of the rollover limit of a farm tractor. The rollover phenomenon is investigated by considering the static stability of the farm tractor on a sloped surface. Three mathematical models are derived to understand the basic features of the rollover mechanism. The models are able to predict the (static) rollover limit for any orientation of the farm tractor with respect to the slope. The effects of tyre stiffness (vertical and lateral) and nonsymmetric implement positioning are analysed. The classical architecture of the farm tractor equipped with a pivoting front axle is compared with the adoption of a passively suspended front axle. In case of a front axle suspension, the rollover limit of the vehicle can be improved, especially when employing non-symmetric implements.

International Journal of Vehicle Design. -- 2014, v. 64, n. 2-4, p. 280-303

1. Farm tractor modelling 2. Roll-over prediction 3. Static stability

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8

Profiling of rough terrain [Texto impreso] / Carl Martin Becker, Pieter Schalk Els

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. 261 : 12 refs.

This study concentrates on obtaining profiles of rough terrain suitable for vehicle dynamics simulations in a cost-effective manner. Commercially available inertial profilometers are unable to profile the terrains of interest due to their severe roughness. A mechanical profilometer is developed and evaluated by profiling obstacles with known profiles, as well as rough 3-D test track profiles. A good correlation between the profiled and actual terrains is achieved. Realistic three-dimensional (3-D) terrain models are generated from the terrain profiles. The Displacement Spectral Densities (DSDs) of the profiled terrains are found to contain discrete peaks; a straight line fit would not be an accurate estimation for the specific rough terrains. Comparisons between the terrains defined in the International Roughness Index (IRI) and the present study indicate that the roughness index of the terrains profiled with the mechanical profilometer is significantly higher than the terrains normally profiled by inertial profilometers.

International Journal of Vehicle Design. -- 2014, v. 64, n. 2-4, p. 240-261

1. 3-dimensional profiles 2. Displacement spectral densities 3. DSD 4. International roughness index 5. IRI 6. Laser 7. Photogrammetry 8. Profilometer 9. Root mean square 10. Rough terrain

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9

The relationship between vehicle yaw acceleration response and steering velocity for steering control [Texto impreso] / M. J. Thoresson, T. R. Botha, P. S. Els

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. 212-213 : 22 refs.

This paper proposes a novel concept for the modelling of a vehicle steering driver model for path following. The proposed steering driver reformulates and applies the Magic Formula, used for tyre lateral force vs. slip angle modelling as a function of vertical force, to the vehicle's yaw acceleration vs. steering velocity response as a function of vehicle speed. The path-following driver model was developed for use in gradient-based mathematical optimisation of vehicle suspension characteristics for handling. Successful application of gradient-based optimisation depends on the availability of good gradient information. This requires a robust driver model that can ensure completion of the required handling manoeuvre, even when the vehicle handling is poor. The steering driver is applied to a nonlinear full vehicle model of a sports utility vehicle, performing a severe double lane change manoeuvre. Simulation results show excellent correlation with test results. The proposed driver model is robust and well suited to gradient-based optimisation of vehicle handling.

International Journal of Vehicle Design. -- 2014, v. 64, n. 2-4, p. 195-213

1. Driver model 2. Handling 3. Magic formula 4. Mathematical optimisation 5. Steering response 6. Steering velocity 7. Tyre characteristics 8. Vehicle design 9. Yaw acceleration response

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10

Simulation and experimental validation of a modified terramechanics model for small-wheeled vehicles [Texto impreso] / G. Meirion-Griffith, M. Spenko

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. 168-169 : 19 refs.

The ability to model and predict vehicle performance over deformable terrains, which is typically done using terramechanics, is important for planetary exploration, military operations, and off-road vehicle design. This paper details the development of a new vehicle-terrain model that specifically addresses some of the limitations of traditional terramechanics when applied to Unmanned Ground Vehicles (UGVs) with small wheel diameters. Assumptions and limitations of the classical Bekker terramechanics model for wheeled locomotion are discussed. A novel pressure-sinkage model that was recently developed by the authors is detailed and shown to improve sinkage and compaction resistance models significantly. These models are implemented in a numerical simulation, which is used to predict the tractive performance of an experimental UGV. Field tests carried out on sandy terrain are described, and the results are used to validate the simulated predictions.

International Journal of Vehicle Design. -- 2014, v. 64, n. 2-4, p. 153-169

1. Bekker theory 2. Pressure-sinkage 3. Small wheels 4. Terramechanics 5. Traction 6. UGVs 7. Unmanned ground vehicles

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11

Snowmobile model for ride dynamic analysis [Texto impreso] / Paul-Andre Hebert, Subhash Rakheja, Marc J. Richard

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. 345-346 : 21 refs.

Snowmobiling involves exposure to high magnitude vibrations. Ride comfort thus forms a major design requirement, currently met through iterative prototyping and field-testing. This study thus aims at developing a snowmobile ride model. The nine degrees-of-freedom ADAMS model includes sub-models for: detailed suspension, track, trail profile, deformable ground, quasi-steady traction, and simplified rider and seat. Four trail roughnesses were characterised through Power Spectral Density. Field tests provided vehicle response. Simulations' agreement ranged from poor to good. A parametric analysis pointed to ride comfort improvements reaching 58%, based on the rms vertical acceleration at the seat.

International Journal of Vehicle Design. -- 2014, v. 64, n. 2-4, p. 325-346

1. Dynamic 2. Ground profiles 3. Ground roughness 4. Off-road 5. Ride analysis 6. Ride dynamic 7. Snowmobile 8. Snowmobile model 9. Snowmobile simulation 10. Snowmobile suspension 11. Track model 12. Traction model 13. Trail profiles

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12

A study of volumetric contact modelling approaches in rigid tyre simulation for planetary rover application [Texto impreso] / W. Petersen, J. McPhee

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. 277-178 : 18 refs.

For planetary rover applications, a volumetric contact modelling approach is used to capture the dynamics of the rigid tyre/soil interface. The volumetric contact model allows for determining closed-form expressions for the tyre contact forces. These volumetric force representations contain information about the shape of the contact geometry so that the analytical expressions result in fast simulations. Three different volumetric rigid tyre models are developed and evaluated from a plasticity point of view. The performance of each tyre is tested and compared with respect to the resistance force caused by the ongoing compaction of the soil and the resultant plastic deformation. The quantity used to model the plastic deformation of the soil is represented by the soil rebound. Moreover, each tyre model is compared against experimental data to evaluate its validity.

International Journal of Vehicle Design. -- 2014, v. 64, n. 2-4, p. 262-279

1. Analytical contact model 2. Contact mechanics 3. Planetary rover simulation 4. Tyre/soil interaction 5. Volumetric contact model

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