Optimization Of Suspension Parameters To Improve Impact

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Information Technology and Computer Application Engineering CRC Press
Issues in Technology Theory, Research, and Application: 2013 Edition is a ScholarlyEditions™ book that delivers timely, authoritative, and comprehensive information about Ocean Technology. The editors have built Issues in Technology Theory, Research, and Application: 2013 Edition on the vast information databases of ScholarlyNews.™ You can expect the information about Ocean Technology in this book to be deeper than what you can access anywhere else, as well as consistently reliable, authoritative, informed, and relevant. The content of Issues in Technology Theory, Research, and Application: 2013 Edition has been produced by the world's leading scientists, engineers, analysts, research institutions, and companies. All of the content is from peer-reviewed sources, and all of it is written, assembled, and edited by the editors at ScholarlyEditions™ and available exclusively from us. You now have a source you can cite with authority, confidence, and credibility. More information is available at http://www.ScholarlyEditions.com/.
Dynamics of Vehicles on Roads and Tracks Vol 2 Springer Nature
These proceedings gather outstanding papers presented at the China SAE Congress 2019. Featuring contributions mainly from China, the biggest carmaker as well as most dynamic car market in the world, the book covers a wide range of automotive topics and the latest technical advances in the industry. Many of the approaches included can help technicians to solve practical problems that affect their daily work. In addition, the book offers valuable technical support to engineers, researchers and postgraduate students in the field of automotive engineering.
Agricultural Engineering Springer Nature
This book focus on innovation, main objectives are to bring the community of researchers in the fields of mechanical design together; to exchange and discuss the most recent investigations, challenging problems and new trends; and to encourage the wider implementation of the advanced design technologies and tools in the world, particularly throughout China. The theme of 2021 ICMD is "Interdisciplinary and Design Innovation" and this conference is expected to provide an excellent forum for cross-fertilization of ideas so that more general, intelligent, robust and computationally economical mechanical design methods are created for multi-disciplinary applications.
Automotive Suspension Control Springer
A resurgence of interest in network synthesis in the last decade, motivated in part by the introduction of the inerter, has led to the need for a better understanding of the most economical way to realize a given passive impedance. This monograph outlines the main contributions to the field of passive network synthesis and presents new research into the enumerative approach and the classification of networks of restricted complexity. Passive Network Synthesis: An Approach to Classification serves as both an ideal introduction to the topic and a definitive treatment of the Ladenheim catalogue. In particular, the authors provide a new analysis and classification of the Ladenheim catalogue, building on recent work, to obtain an improved understanding of the structure and realization power of the class within the biquadratic positive-real functions. This book is intended for researchers in systems and control, real algebraic geometry, electrical and mechanical networks, and dynamics and vibration.
Advances in Engineering Design CRC Press
This volume contains 60 papers presented at ICTIS 2015: International Conference on Information and Communication Technology for Intelligent Systems. The conference was held during 28th and 29th November, 2015, Ahmedabad, India and organized communally by Venus International College of Technology, Association of Computer Machinery, Ahmedabad Chapter and Supported by Computer Society of India Division IV – Communication and Division V – Education and Research. This volume contains papers mainly focused on ICT and its application for Intelligent Computing, Cloud Storage, Data Mining, Image Processing and Software Analysis etc.
An Energy-Regenerative Vehicle Suspension System - Development, Optimization, and Improvement Springer Science & Business Media
This study evaluates the dynamic response of three semi-active control policies as analyzed on a several off-road models. Two-axle 7DOF, three-axle 9DOF and four-axle 11DOF full vehicle system was developed to evaluate skyhook, groundhook, and hybrid controls. As well as exploring the relative benefits of each of these controllers, the performance of each semi-active controller was compared to the performance of conventional passive system. Each control policy is evaluated for its control performance under three different base excitations: step, bump and random. Corresponding to the bump and random inputs, peak-to-peak, RMS and frequency responses are considered for each control policy along with passive system. Specifically, sprung mass (heavy, pitch and roll acceleration), suspension and tire deflection. A comparison between different suspension systems were examined using half vehicle model and step input used to generate the time domain values of settling time and PTP acceleration for hybrid control policy and compared to fully active and passive systems using two-axle half vehicle model. Furthermore, Due to the importance of ride comfort for off-road vehicles, minimizing the peak-to-peak of the vertical, pitch and roll acceleration and reducing the settling time would lead to better ride comfort. In solving this problem, the step input was used for the optimization of a two-axle full vehicle's semi-active suspension system parameters with respect to ride comfort and handling. Genetic algorithm optimization technique is developed and used. Step input also used to generate the time domain and frequency domain responses of the four-axle full vehicle model. Reponses of sprung mass, suspension and tired deflection are obtained. Results of this study show that semi-active control offers benefits beyond those of conventional passive system. Further, traditional skyhook control is shown to be better in improving the vehicle body acceleration PTP, RMS and PSD responses. The groundhook control is shown to be better in controlling the tire deflection. Hybrid as a combination of both control policies skyhook and groundhook, shows to be better compromise in improving ride comfort and handling of the vehicle compared to passive system in all cases. Result shows also, that GA has consistently found near-optimal solutions within specified parameters ranges for several independent runs. Ride comfort improved without reducing the handling of the vehicle.
ScholarlyEditions
This proceedings volume brings together some 189 peer-reviewed papers presented at the International Conference on Information Technology and Computer Application Engineering, held 27-28 August 2013, in Hong Kong, China. Specific topics under consideration include Control, Robotics, and Automation, Information Technology, Intelligent Computing and Telecommunication, Computer Science and Engineering, Computer Education and Application and other related topics. This book provides readers a state-of-the-art survey of recent innovations and research worldwide in Information Technology and Computer Application Engineering, in so-doing furthering the development and growth of these research fields, strengthening international academic cooperation and communication, and promoting the fruitful exchange of research ideas. This volume will be of interest to professionals and academics alike, serving as a broad overview of the latest advances in the dynamic field of Information Technology and Computer Application Engineering.
Advances in Mechanical Engineering John Wiley & Sons
This book systematically presents the theory, numerical implementation, field experiments and practical engineering applications of the 'Vehicle–Track Coupled Dynamics'. Representing a radical departure from classic vehicle system dynamics and track dynamics, the vehicle–track coupled dynamics theory considers the vehicle and track as one interactive and integrated system coupled through wheel–rail interaction. This new theory enables a more comprehensive and accurate solution to the train–track dynamic interaction problem which is a fundamental and important research topic in railway transportation system, especially for the rapidly developed high-

speed and heavy-haul railways. It has been widely applied in practical railway engineering. Dr. Wanming Zhai is a Chair Professor of Railway Engineering at Southwest Jiaotong University, where he is also chairman of the Academic Committee and Director of the Train and Track Research Institute. He is a member of the Chinese Academy of Sciences and one of the leading scientists in railway system dynamics. Professor Zhai is Editor-in-Chief of both the International Journal of Rail Transportation, published by Taylor & Francis Group, and the Journal of Modern Transportation, published by Springer. In addition, he is a trustee of the International Association for Vehicle System Dynamics, Vice President of the Chinese Society of Theoretical and Applied Mechanics, and Vice President of the Chinese Society for Vibration Engineering. /div

Passive Network Synthesis: An Approach to Classification Trans Tech Publications Ltd

This book offers a snapshot of the latest research and developments in road and railway vehicle dynamics. Gathering peer-reviewed contributions to the 27th Symposium of the International Association of Vehicle System Dynamics (IAVSD), held online on August 17–19, 2021, from Saint Petersburg, Russia, it offers extensive information for both researchers and professionals in the field of ground vehicle dynamics, control and design. It covers cutting-edge methods and solutions for solving ground vehicle system dynamics-related problems, concerning control and monitoring, performance, safety and braking of road and rail vehicles, including electric and autonomous ones. Further, it reports on significant advances in vehicle design, and important applications to improve ride comfort. Overall, the book provides academics and professional with a timely reference guide on theories and methods to understand, analyze and improve vehicle stability and dynamics in a broad range of different operating conditions. Chapter "Experimental Validation of a Semi-physical Modelling Approach of the Influence of Tyre Rotation on the Vertical Tyre Force Transmission and Tyre Kinematics" is available open access under a Creative Commons Attribution 4.0 International License via link.springer.com.

Development of Computerized Active Vehicle Suspensions Springer Nature

The two-volume set IFIP AICT 419 and 420 constitutes the refereed post-conference proceedings of the 7th IFIP TC 5, WG 5.14 International Conference on Computer and Computing Technologies in Agriculture, CCTA 2013, held in Beijing, China, in September 2013. The 115 revised papers presented were carefully selected from numerous submissions. They cover a wide range of interesting theories and applications of information technology in agriculture, including Internet of things and cloud computing; simulation models and decision-support systems for agricultural production; smart sensor, monitoring, and control technology; traceability and e-commerce technology; computer vision, computer graphics, and virtual reality; the application of information and communication technology in agriculture; and universal information service technology and service systems development in rural areas.

Hysteresis Characterization and Control of Electrorheological and Magnetorheological Materials Springer

An active, computerized, adaptive control system is discussed for the control of vehicle vibrations by means of adjustment of suspension parameters during the ride. The problem is subdivided into two basic parts. One, optimization of vehicle suspension parameters if forward speed, terrain statistics and vehicle descriptors are known a-priori. This information is developed off board and stored on board in the computer memory. Two, methods of evaluating terrain data received from sensors on board the vehicle and subsequently processing it for comparison with the stored data contained in the memory. Methods of signaling the selection of best parameters by means of amplifiers, solenoids and valves to the suspension system (Conceptual design). The use of fluid suspension elements is shown to permit automatic height control (static deflection control relative to payload) together with dynamic deflection control based on root mean square values of the input displacements. The theoretical problem treatment refers to linear suspension systems subject to random inputs. Included is an analog computer program and results of trial runs. (Author).

Issues in Technology Theory, Research, and Application: 2013 Edition Springer Nature

This book provides a thorough and fresh treatment of the control of innovative variable-geometry vehicle suspension systems. A deep survey on the topic, which covers the varying types of existing variable-geometry suspension solutions, introduces the study. The book discusses three important aspects of the subject: • robust control design; • nonlinear system analysis; and • integration of learning and control methods. The importance of variable-geometry suspensions and the effectiveness of design methods implemented in the autonomous functionalities of electric vehicles—functionalities like independent steering and torque vectoring—are illustrated. The authors detail the theoretical background of modeling, control design, and analysis for each functionality. The theoretical results achieved through simulation examples and hardware-in-the-loop scenarios are confirmed. The book highlights emerging ideas of applying machine-learning-based methods in the control system with guarantees on safety performance. The authors propose novel control methods, based on the theory of robust linear parameter-varying systems, with examples for various suspension systems. Academic researchers interested in automotive systems and their counterparts involved in industrial research and development will find much to interest them in the eleven chapters of Control of Variable-Geometry Vehicle Suspensions.

Measurement of Vehicle and Suspension Parameters for Directional Control Studies Springer Nature

With the rapid development of hybrid and fully electric vehicles, electromagnetic suspensions have shown great potential for capturing energy while offering high-level ride comfort. The objective of this research was to develop an electromagnetic-based vehicle suspension system that allows for regeneration of road-induced vibration energy and supplies better dynamics control. A small-scale proof-of-concept system consisting of a mass-spring-damper system, ball screw mechanism, and direct current (DC) machine was designed. The vibration energy in the mass-spring-damper system caused vertical motion of sprung mass and the ball screw mechanism to convert the translational motion into rotary motion, which resulted in the generation of back electromotive force of the DC machine. Systematic optimization methodologies were utilized to provide for selective adaption of suspension parameters, such as spring constant (rate) and damping coefficient, according to different road surface conditions, including harmonic and stochastic waveforms. By maximizing the average of power generation or minimizing the root-mean-square of the sprung mass's absolute acceleration by selecting optimal parameters, the suspension allowed operation in either energy-oriented mode or control-oriented mode. Furthermore, a bandwidth enhancement technique utilizing cubic nonlinearities was demonstrated to improve the energy harvesting capability of the suspension system. A self-powered regenerative Skyhook control strategy was proposed to overcome the trade-off between passive control (insufficient control) and active control (external energy demand) for the suspension system.

Proceedings of First International Conference on Information and Communication Technology for Intelligent Systems: Volume 2 Springer Nature

A comprehensive overview of integrated vehicle systemdynamics exploring the fundamentals and new and emergingdevelopments This book provides a comprehensive coverage of vehicle systemdynamics and control, particularly in the area of integratedvehicle dynamics control. The book consists of two parts, (1)development of individual vehicle system dynamic model and controlmethodology; and (2) development of integrated vehicle dynamicmodel and control methodology. The first part focuses oninvestigating vehicle system dynamics and control according to thethree directions of vehicle motions, including longitudinal,vertical, and lateral. Corresponding individual control systems,e.g. Anti-lock Brake System (ABS), Active Suspension, ElectricPower Steering System (EPS), are introduced and developedrespectively. Particular attention is paid in the second part of the book todevelop integrated vehicle dynamic control system. Integratedvehicle dynamics control system is an advanced system thatcoordinates all the chassis control systems and components toimprove the overall vehicle performance including safety, comfort,and economy. Integrated vehicle dynamics control has been animportant research topic in the area of vehicle dynamics andcontrol over the past two decades. The research topic on integratedvehicle dynamics control is investigated comprehensively andintensively in the book through both theoretical analysis andexperimental study. In this part, two types of controlarchitectures, i.e. centralized and multi-layer, have beendeveloped and compared to demonstrate their advantages anddisadvantages. Integrated vehicle dynamics control is a hot topic inautomotive research; this is one of the few books to address boththeory and practice of integrated systems Comprehensively explores the research area of integratedvehicle dynamics and control through both theoretical analysis andexperimental study Addresses a full range of vehicle system topics including tyredynamics, chassis systems, control architecture, 4 wheel steeringsystem and design of control systems using Linear Matrix Inequality(LMI) Method

Concurrent Engineering Approaches for Sustainable Product Development in a Multi-Disciplinary Environment Springer Nature

Vehicle dynamics and road dynamics are usually considered to be two largely independent subjects. In vehicle dynamics, road surface roughness is generally regarded as random excitation of the vehicle, while in road dynamics, the vehicle is generally regarded as a moving load acting on the pavement. This book suggests a new research concept to integrate the vehicle and the road system with the help of a tire model, and establishes a cross-subject research framework dubbed vehicle-pavement coupled system dynamics. In this context, the dynamics of the vehicle, road and the vehicle-road coupled system are investigated by means of theoretical analysis, numerical simulations and field tests. This book will be a valuable resource for university professors, graduate students and engineers majoring in automotive design, mechanical engineering, highway engineering and other related areas. Shaopu Yang is a professor and deputy president of Shijiazhuang Tiedao University, China; Liqun Chen is a professor at Shanghai University, Shanghai, China; Shaohua Li is a professor at Shijiazhuang Tiedao University, China.

Control of Variable-Geometry Vehicle Suspensions Springer Nature

"This study provides basic information on the analysis and optimization of vehicle suspension systems with a damped absorber attached to the sprung mass and the un sprung mass. This study is also concerned with comparing these systems with a optimized conventional system. A two degree of freedom linear model subjected to guideway irregularity, described as a hyperbolic displacement spectral density, random excitation is chosen for studying the system. Dimensionless space and design parameters are selected to allow for adequate generality. The objective function incorporates the tire-terrain normal force, as an indication of the vehicle controllability, constrained by the sprung mass acceleration as a comfort criteria. Optimum parameter synthesis of damped absorber suspension with the damped absorber attached to sprung and unsprung mass, as well as a conventional suspension system has been obtained. Performance characteristics for the optimum damped absorber suspension and the conventional suspension are presented. The comparison among the optimised conventional, and the optimized damped absorber suspension systems show that the optimum damped absorber suspension with the absorber attached to the unsprung mass, based on the objective function chosen, is the best."--Abstract.

Advances in Dynamics of Vehicles on Roads and Tracks II Springer Science & Business Media

Volume is indexed by Thomson Reuters CPCI-S (WoS). This two-volume set contains 317 peer-reviewed papers from the Fourth International Conference on Measuring Technology and Mechatronics Automation (ICMTMA). The latter aimed to provide a high-level international forum where scientists, engineers and educators could present the state-of-the-art of measurement technology and mechatronics automation research and their applications in diverse fields.

Proceedings of the 19th Asia Pacific Automotive Engineering Conference & SAE-China Congress 2017: Selected Papers Springer

This book covers complex issues for a vehicle suspension model, including non-linearities and uncertainties in a suspension model, network-induced time delays, and sampled-data model from a theoretical point of view. It includes control design methods such as neural network supervisory, sliding mode variable structure, optimal control, internal-model principle, feedback linearization control, input-to-state stabilization, and so on. Every control method is applied to the simulation for comparison and verification. Features: Includes theoretical derivation, proof, and simulation verification combined with suspension models Provides the vibration control strategies for sampled-data suspension models Focuses on the suspensions with time-delays instead of delay-free Covers all the models related to quarter-, half-, and full-vehicle suspensions Details rigorous mathematical derivation process for each theorem supported by MATLAB®-based simulation This book is aimed at researchers and graduate students in automotive engineering, vehicle vibration, mechatronics, control systems, applied mechanics, and vehicle dynamics.

Vehicle–Track Coupled Dynamics Springer Science & Business Media

Optimization and Control of Semi-active Suspension System for Off-road Vehicles

Computer and Computing Technologies in Agriculture VII CRC Press

This book presents the select proceedings of Congress on Advances in Materials Science and Engineering (CAMSE 2020). It focuses on the state-of-the-art research, development, and commercial prospective of recent advances in mechanical engineering. The book covers various synthesis and fabrication routes of functional and smart materials for applications in mechanical engineering, manufacturing, physics, chemical and biological sciences, metrology, optimization and artificial intelligence among others. This book will be a useful resource for researchers, academicians as well as professionals interested in the highly interdisciplinary field of materials science and mechanical engineering.