



1. Aerodynamic simulation result in StarCCM+.
2. Frequency response analysis on a door using Nastran and CDH tools.

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AERODYNAMIC LOADS IN A FULL-VEHICLE NVH ANALYSIS

Aerodynamic Induced Noise

Many vibration and acoustic effects in full vehicles are caused by fluctuating aerodynamic loads. Related tasks in automotive development are

- analysis of underbody paneling and attachment to body,
- analysis of engine hood flatter,
- interior acoustic analysis with external aero-acoustic loads.

In order to perform realistic noise vibration harshness (NVH) analysis, the exciting aerodynamic forces have to be taken into account.

MpCCI FSIMapper

The tool MpCCI FSIMapper builds the link between the simulation of the vehicle's aerodynamics and the NVH-simulation. It transfers the pressure excitation from the CFD calculation to the (not necessarily matching) NVH-mesh.

The transient pressure fluctuations on the vehicle's surface can be automatically transformed by a Fourier decomposition in order to create the frequency dependent loading for the vibration analysis.

The tool offers features such as windowing, time range filtering and frequency truncation for the export.

For Nastran NVH analyses, the optimized export format "Rload1_Opt" is available for efficient simulations using CDH/AMLS.

Cooperation with CDH AG

In 2016, CDH AG has been granted marketing, sales and support rights to distribute MpCCI solutions in North America and Japan.



MpCCI
FSIMapper

Aerodynamic Loads In A Full Vehicle Nvh Analysis

**Thomas Zurawka,Joerg
Schaeuffele,Roger Carey**



Aerodynamic Loads In A Full Vehicle Nvh Analysis:

Advances in Italian Mechanism Science Giuseppe Quaglia, Giovanni Boschetti, Giuseppe Carbone, 2024-08-01 This book presents the proceedings of the 5th International Conference of IFToMM ITALY IFIT held in Turin Italy on September 11-13, 2024. It includes peer-reviewed papers on the latest advances in mechanism and machine science, discussing topics such as biomechanical engineering, computational kinematics, the history of mechanism and machine science, gearing and transmissions, multi-body dynamics, robotics and mechatronics, the dynamics of machinery, tribology, vibrations, rotor dynamics, and vehicle dynamics. A valuable up-to-date resource, it offers an essential overview of the subject for scientists and practitioners alike and inspires further investigations and research. *International Aerospace Abstracts*, 1994

Technical Literature Abstracts Society of Automotive Engineers, 2000 *Technical Analysis of Vehicle Load Reduction Potential for Advanced Clean Cars* Greg Pannone, 2015 *Mechanical Vibration* Haym Benaroya, Mark Nagurka, Seon Han, 2017-08-29 *Mechanical Vibration Analysis: Uncertainties and Control* Fourth Edition addresses the principles and application of vibration theory. Equations for modeling vibrating systems are explained, and MATLAB is referenced as an analysis tool. The Fourth Edition adds more coverage of damping, new case studies, and development of the control aspects in vibration analysis. A MATLAB appendix has also been added to help students with computational analysis. This work includes example problems and explanatory figures, biographies of renowned contributors, and access to a website providing supplementary resources. *Vehicle/Tire/Road Dynamics* Tan Li, 2022-11-24 *Vehicle Tire Road Dynamics: Handling, Ride, and NVH* presents the connection between NVH and conventional vehicle dynamics, where both tire and road play a key role. In this book, there is a chapter for handling dynamics that provides an introduction to ride dynamics and a chapter for ride dynamics that provides an introduction to NVH, presenting better coherence and synergy between these major areas of vehicle tire dynamics. Accompanying the fundamental theories, case studies are given to facilitate comprehension. In addition to the experimental implementations, the state-of-the-art approaches to simulating vehicle tire dynamics are presented from the viewpoint of both industry and academia. This new book bridges the gap for experts in tire or pavement NVH, also tire-pavement interaction, noise, and those who are experts in vehicle dynamics. Conventional vehicle dynamics, e.g., handling, braking, cornering, is focused on low-frequency performance, while NVH, noise, vibration, harshness, is focused on high-frequency performance. There is also another area called ride comfort/stability, which focuses on mid-frequency. Presents a closed-loop system for vehicle dynamics, covering handling, ride, and NVH. Provides insights into how intelligent tires will enhance autonomous vehicle control and optimize multiple performances, especially for electric vehicles. Demonstrates how pavement characteristics could greatly influence vehicle handling, ride, NVH, and improve balance these performances.

Noise, Vibration and Harshness of Electric and Hybrid Vehicles Lijun Zhang, Dejian Meng, Gang Chen, 2020-12-29 The noise, vibration, and harshness (NVH), also known as noise and vibration (NV), is a critical feature for customers to assess the

performance and quality of vehicles NVH characteristics are higher among factors that customers use to judge the vehicle's quality. This book sets out to introduce the basic concepts, principles and applications of the NVH development and refinement of Battery Electric Vehicles (BEV), Hybrid Electric Vehicles (HEV) and Fuel Cell Electric Vehicles. Each type comes with its own set of challenges.

12th International Munich Chassis Symposium 2021 Peter Pfeffer, 2022-04-18. The increasing automation of driving functions and the electrification of powertrains present new challenges for the chassis with regard to complexity, redundancy, data security and installation space. At the same time, the mobility of the future will also require entirely new vehicle concepts, particularly in urban areas. The intelligent chassis must be connected, electrified and automated in order to be best prepared for this future.

Contents: Driving Simulators, Innovative Chassis Systems, Automated Driving and Racing, New Methods and Systems, Suspension and Ride Comfort, All-Wheel Steering, Future Brake Systems and Testing Technology, Innovations in Tires and Wheels.

Target audiences: Automotive engineers and chassis specialists, as well as students looking for state-of-the-art information regarding their field of activity, Lecturers and instructors at universities and universities of applied sciences with the main subject of automotive engineering, Experts, researchers and development engineers of the automotive and the supplying industry.

Publisher: ATZ live stands for top quality and a high level of specialist information and is part of Springer Nature, one of the leading publishing groups worldwide for scientific, educational and specialist literature.

Partner: T V S D is an international leading technical service organisation catering to the industry mobility and certification segment.

Simultaneous Engineering for New Product Development Jack Ribbens, 2000-02-14. An integrated, highly practical approach to product development using simultaneous engineering. Industrial engineers and designers, as well as managers working on new product development (NPD), typically do not have the time or the expertise to get involved in functions outside their immediate area. Yet the very nature of NPD requires a number of functions and processes to be performed concurrently. This is where simultaneous engineering comes in. *Simultaneous Engineering for New Product Development* offers state-of-the-art integrated coverage of these two hot topics in manufacturing. Industry expert Jack Ribbens draws on firsthand experience with the successful application of simultaneous engineering in the automotive industry, discussing how this approach can help streamline the entire development and production process, resulting in high-quality, competitive goods. He examines all phases of the process, devoting a chapter to each key element, from market research to design and engineering to manufacturing, selling and customer service and support. And while most books on concurrent engineering stress the theoretical aspects of the field, Ribbens's book is decidedly practical, complete with case studies from the automotive, aerospace, heavy vehicle and electronic industries that can be applied to any manufactured product. With mathematical model development, as well as useful graphs, checklists and references, *Simultaneous Engineering for New Product Development* will help manufacturing professionals take advantage of new trends and technologies in manufacturing well into the twenty-first century.

[International Journal of Vehicle Design](#)

,1997 *Vehicle Noise and Vibration Refinement* Xu Wang,2010-03-12 High standards of noise vibration and harshness NVH performance are expected in vehicle design Refinement is therefore one of the main engineering design attributes to be addressed when developing new vehicle models and components Vehicle noise and vibration refinement provides a review of noise and vibration refinement principles methods advanced experimental and modelling techniques and palliative treatments necessary in the process of vehicle design development and integration in order to meet noise and vibration standards Case studies from the collective experience of specialists working for major automotive companies are included to form an important reference for engineers practising in the motor industry who seek to overcome the technological challenges faced in developing quieter more comfortable cars The reader will be able to develop an in depth knowledge of the source and transmission mechanisms of noise and vibration in motor vehicles and a clear understanding of vehicle refinement issues that directly influence a customer s purchasing decision Reviews noise and vibration refinement principles methods and modelling techniques necessary in vehicle design development and integration in order to meet noise and vibration standards Outlines objectives driving development and the significance of vehicle noise and vibration refinement whilst documenting definitions of key terms for use in practice Case studies demonstrate measurement and modelling in industry and illustrate key testing methods including hand sensing and environmental testing Diesel Engine System

Design Qianfan Xin,2011-05-26 Diesel Engine System Design links everything diesel engineers need to know about engine performance and system design in order for them to master all the essential topics quickly and to solve practical design problems Based on the author s unique experience in the field it enables engineers to come up with an appropriate specification at an early stage in the product development cycle Links everything diesel engineers need to know about engine performance and system design featuring essential topics and techniques to solve practical design problems Focuses on engine performance and system integration including important approaches for modelling and analysis Explores fundamental concepts and generic techniques in diesel engine system design incorporating durability reliability and optimization theories

Annual Index/abstracts of SAE Technical Papers ,2007 *Automotive Software Engineering* Thomas Zurawka,Joerg Schaeuffele,Roger Carey,2016-09-18 Since the early seventies the development of the automobile has been characterized by a steady increase in the deployment of onboard electronics systems and software This trend continues unabated and is driven by rising end user demands and increasingly stringent environmental requirements Today almost every function onboard the modern vehicle is electronically controlled or monitored The software based implementation of vehicle functions provides for unparalleled freedoms of concept and design However automobile development calls for the accommodation of contrasting prerequisites such as higher demands on safety and reliability vs lower cost ceilings longer product life cycles vs shorter development times along with growing proliferation of model variants Automotive Software Engineering has established its position at the center of these seemingly conflicting opposites This book provides background basics as well as numerous

suggestions rare insights and cases in point concerning those processes methods and tools that contribute to the surefooted mastery of the use of electronic systems and software in the contemporary automobile Composite Materials in Design Processes Giangiacomo Minak,2021-09-02 The use of composite materials in the design process allows one to tailor a component's mechanical properties thus reducing its overall weight On the one hand the possible combinations of matrices reinforcements and technologies provides more options to the designer On the other hand it increases the fields that need to be investigated in order to obtain all the information requested for a safe design This Applied Sciences Special Issue Composite Materials in Design Processes collects recent advances in the design methods for components made of composites and composite material properties at a laminate level or using a multi scale approach **Automotive Engineering** ,1978

Automotive Engineering International ,2006 *2014 Passenger Car Yearbook* Automotive Engineering International,2013-12-10 Each year car manufacturers release new production models that are unique and innovative These cars begin as concepts then go through the process of prototyping The process of creating a new model can take years involving extensive testing and refining of aerodynamics safety engine components and vehicle styling The production model is the result of this lengthy process and its new technologies reflect the latest engineering standards as well as market trends The 2014 Passenger Car Yearbook details the key engineering developments in the passenger vehicle industry of the year Each new car model is profiled in its own chapter with one or more articles that were previously published and written by the award winning editors of Automotive Engineering International The novel engineering aspects of each new model are explored in depth Interviews with key developers and engineers are included for some of the models providing inside details about how initial ideas evolved in the cars that consumers drive Published for enthusiasts who are interested in new car models and their technologies as well as practicing automotive engineers who are interested in new engineering trends such as hybrid systems powertrain designs automotive design lightweighting and materials and new engineers who want an overview of current trends the 2014 Passenger Car Yearbook also Provides a single source for information on the key engineering trends of one year Allows the reader to skip to chapters that cover specific car models that interest them or read about all models from beginning to end Makes for dynamic reading with its large number of big full color images and easy reading magazine format *Annual Index/abstracts of SAE Technical Papers* 2004 ,2005 **Essential Readings in**

Magnesium Technology Suveen Mathaudhu,Alan Luo,Neale Neelameggham,Eric Nyberg,Wim Sillekens,2016-12-06 This is a compilation of the best papers in the history of Magnesium Technology a definitive annual reference in the field of magnesium production and related light metals technologies The volume contains a strong topical mix of application and fundamental research articles on magnesium technology Section titles 1 Magnesium Technology History and Overview 2 Electrolytic and Thermal Primary Production 3 Melting Refining Recycling and Life Cycle Analysis 4 Casting and Solidification 5 Alloy and Microstructural Design 6 Wrought Processing 7 Modeling and Simulation 8 Joining 9 Corrosion

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