

DOWNLOAD PDF FUNDAMENTALS OF NOISE AND VIBRATION ANALYSIS FOR ENGINEERS

Chapter 1 : Fundamentals-of-noise-and-vibration-analysis-for-engineers_ä⁰⁰ä⁰⁰æ-†ä⁰“ç^{1/2}‘

The book's analysis of noise and vibration emphasizes wave-mode duality and interactions between sound waves and solid structures. Primarily a textbook for senior level undergraduate and graduate courses, the volume is also a valuable reference for researchers and practicing engineers.

The sources of noise in a vehicle can be classified as aerodynamic e. Many problems are generated as either vibration or noise, transmitted via a variety of paths, and then radiated acoustically into the cabin. Others are generated acoustically and propagated by airborne paths. Structure-borne noise is attenuated by isolation, while airborne noise is reduced by absorption or through the use of barrier materials. Vibrations are sensed at the steering wheel, the seat, armrests, or the floor and pedals. Some problems are sensed visually - such as the vibration of the rear-view mirror or header rail on open-topped cars Tonal versus broadband[edit] NVH can be tonal such as engine noise, or broadband, such as road noise or wind noise, normally. Some resonant systems respond at characteristic frequencies, but in response to random excitation. Therefore, although they look like tonal problems on any one spectrum, their amplitude varies considerably. Other problems are self resonant , such as whistles from antennas. Tonal noises often have harmonics. The x axis is given in terms of multiples of engine speed. The y axis is logarithmic, and uncalibrated. Instrumentation[edit] Typical instrumentation used to measure NVH include microphones , accelerometers and force gauges, or load cells. Many NVH facilities will have semi- anechoic chambers , and rolling road dynamometers. Typically signals are recorded direct to hard disk via an analog-to-digital converter. In the past magnetic or DAT tape recorders were used. The integrity of the signal chain is very important, typically each of the instruments used are fully calibrated in a lab once per year, and any given setup is calibrated as a whole once per day. Laser scanning vibrometry is an essential tool for effective NVH optimization. The vibrational characteristics of a sample is acquired full field under operational or excited conditions. The results represent the actual vibrations. No added mass is influencing the measurement, as the sensor is light itself. Most NVH work is done in the frequency domain, using fast Fourier transforms to convert the time domain signals into the frequency domain. Wavelet analysis, order analysis, statistical energy analysis , and subjective evaluation of signals modified in real time are also used. Computer-based modeling[edit] NVH needs good representative prototypes of the production vehicle for testing. These are needed early in the design process as the solutions often need substantial modification to the design, forcing in engineering changes which are much cheaper when made early. These early prototypes are very expensive, so there has been great interest in computer aided predictive techniques for NVH. Back-of-envelope calculations are very useful. One example is the modelling works for structure borne noise and vibration analysis. For the mid-frequency band, various methodologies exist, such as vibro-acoustic finite element analysis , and boundary element analysis. The structure can be coupled to the interior cavity and form a fully coupled equation system. Also other techniques exist that can mix measured data with finite element or boundary element data. Typical solutions[edit] There are three principal means of improving NVH: Deciding which of these or what combination to use in solving a particular problem is one of the challenges facing the NVH engineer. Specific methods for improving NVH include the use of tuned mass dampers , subframes , balancing , modifying the stiffness or mass of structures, retuning exhausts and intakes , modifying the characteristics of elastomeric isolators, adding sound deadening or absorbing materials, or using active noise control. In some circumstances, substantial changes in vehicle architecture may be the only way to cure some problems cost effectively. See also[edit] This " see also " section may contain an excessive number of suggestions. Please ensure that only the most relevant links are given, that they are not red links , and that any links are not already in this article.

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Chapter 2 : Fundamentals of Noise and Vibration Analysis for Engineers | chandika pradeep - calendrierde

Michael P. Norton is a Professor of Mechanical Engineering in the Department of Mechanical and Materials Engineering at the University of Western Australia, the Director of the Centre for Acoustics, Dynamics and Vibration at that University, and a Foundation Director of SVT - Engineering Consultants.

The main objective of the course is to provide students with the skills and knowledge required to practise in the field of noise and vibration control technology. Readers do not need prior formal training in acoustics although a basic understanding of mechanics, fluid dynamics and applied mathematics is required. Many of the chapters use examples of models and forms of analysis to illustrate the principles that they introduce. By pointing toward the practical application of these fundamental principles and methods, the book will benefit those wishing to extend their knowledge and understanding of acoustic and vibration technology for professional purposes. *Advanced Applications in Acoustics, Noise and Vibration* serves as a companion volume. The subject of vibro-acoustics is important for the design of machine elements and structures, to minimize sound generated by them. For better machine designing, it is necessary for machine designers mechanical engineers to have a thorough knowledge of vibro-acoustics. Furthermore, since the design cycles of machines have become shorter, designers will have to design quiet machines at the drawing-board stage rather than applying "band-aid" techniques after the machine has been built. Although there is common ground in the treatment of acoustics, the subject of vibration is not very fortunate. Those interested in low-frequency vibration are generally concerned with the modal approach of using natural frequencies and mode shapes, whereas those interested in vibro-acoustics in medium and high frequencies are generally concerned with the wave approach. Since both modal and wave approaches have their advantages, it is a good idea to study both together to get the best out of them. This is useful for a better understanding the physics of vibro-acoustics. Written for students and professionals interested in gaining knowledge, this book systematically integrates the relevant aspects of vibro-acoustics from various viewpoints. It provides them with the tools essential to tackle the problem of vibrations produced in machines and structures due to unbalanced forces and the noise produced thereof. The text lays emphasis on mechanical engineering applications of the subject and develops conceptual understanding with the help of many worked-out examples. What distinguishes the text is that three chapters are devoted to Sound Level and Subjective Response to Sound, Noise: Effects, Ratings and Regulations and Noise: Sources, Isolation and Control. Importance of mathematical formulation in converting a distributed parameter vibration problem into an equivalent lumped parameter problem is also emphasized. Primarily designed as a text for undergraduate and postgraduate students of mechanical engineering, this book would also be useful for undergraduate and postgraduate students of civil, aeronautical and automobile engineering as well as practising engineers.

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Chapter 3 : Noise, vibration, and harshness - Wikipedia

Noise and Vibration affects all kinds of engineering structures, and is fast becoming an integral part of engineering courses at universities and colleges around the world. In this second edition, Michael Norton's classic text has been extensively updated to take into account recent developments in the field.

Cambridge University Press, New York, , pp. Dynamic fracture mechanics is a sub-topic of the larger field of fracture mechanics. This sub-topic generally addresses inertial participation in crack growth and the rate of crack growth. The book by Frennd is a comprehensive treatise on the state of theoretical dynamic fracture mechanics. The solutions to dynamic problems in fracture mechanics are shown largely through energy methods and continuum mechanics. The author emphasizes stress field prediction, crack growth speed and elasto-plastic materials. This book is theoretically very thorough for metallic and the elastomeric materials, however, the practical application of these theories are never brought forward. There is little comparison of the physical test results to theoretic solutions. The author does not present any numeric applications of the espoused theories, but rather refers to an extensive bibliography. This is a good book for theoretical physicists and analytic researchers, it would be difficult to teach from this text and the text would not serve engineers as a reference. Fundamentals of Noise and Vibration Analysis for Engineers. Cambridge University Press, Cambridge, Mass. The author of this book should be complimented on producing a text to combine the fundamental aspects of nearly all the vital elements of noise and vibration engineering to include statistical energy analysis, noise and vibration interaction and the use of noise and vibration as a diagnostic tool. In particular, the reader should find the chapter on statistical energy analysis of much value indeed. However, well documented case histories are still somewhat lacking to render the book more valuable for the undergraduate engineers as well as for practicing engineers. Sometimes [cannot help feeling that most authors tend to provide for specific demands or trends in their own countries. On the other hand, in the U. In such cases more in-depth books on single topics can be more beneficial for both undergraduate and post-graduate studies. For example, Professor Daniel Ikrshader and I are coauthoring a new book on "Acoustics for Engineers" for the Stanford University acoustics engineering courses. In our case we are planning to include specific topics Norton has elected to omit, but we feel the Stanford engineering students would find most applicable. Department of Mechanical Engineering S. Applied Theory of Vibration h o l a t l m Systems. Hemisphere Publishing Corporation, New York, , pp. This book was originally published by the two Russian authors Frolov and Furman in to record their studies in the field of vibration isolation coupled with some case histories. The authors emphasize on two aspects of vibration isolation which are somewhat lacking in similar monographs--namely active vibration isolation systems and vibration response of the human operator in most body conditions. Their treatment of nonlinear vibration isolation systems could have been expanded to greater benefit to treat nonlinear vibration isolation under varying degrees of gravity conditions. The authors have made an effort to cover basic vibration fundamentals which are normally well documented in standard vibration textbooks such as Theory of Vibration with Applications by W. Thomson and Vibration for Engineers by A.

Chapter 4 : Fundamentals of Noise and Vibration Analysis for Engineers by M.P. Norton

f-Fundamentals of Noise and Vibration Analysis for Engineers Second edition M. P. Norton School of Mechanical Engineering, University of Western Australia.

Chapter 5 : Fundamentals of Noise and Vibration - Google Books

Noise and Vibration source identification on a large induction motor Identification of rolling-contact bearing damage

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Flow-induced noise and Vibration associated with a gas pipeline

Chapter 6 : fundamentals of noise and vibration analysis for engineers | Download eBook PDF/EPUB

Fundamentals of Noise and Vibration Analysis for Engineers / Edition 2 Michael Norton's classic text has been extensively updated to include the latest developments in the field. The book's analysis of noise and vibration emphasizes wave-mode duality and interactions between sound waves and solid structures.