Active Noise Cancellation In A Suspended Interferometer

Understanding Active Noise CancellationCRC Press
Noise Control: From Concept to Application presents the basic principles of noise control and their practical application to real problems. Numerous examples are worked out in detail and are used to illustrate the concepts in the book. There are few derivations of equations, but reference is made to texts from which these are derived. An excellent learning tool for students and practitioners, this guide to noise control will enable readers to use their knowledge to solve a wide range of industrial noise control problems. Working from basic scientific principles, the author shows how an understanding of sound can be applied to real-world settings.
"Noise present on the power supply and ground becomes an ever increasing problem because device quality tends to degrade as it enters into the deep sub-micron region. The parasitic elements within the interconnect structure increase since its dimensions scale along with the devices. Inductive elements of the interconnect and bond wire cause voltage fluctuations on the power supply and ground due to the constant switching of digital elements. This results in a decrease in the amount of voltage headroom which is available to the digital circuitry. This problem is exacerbated as the operating frequency and the number of devices placed on a chip increases with each new device generation. Decoupling capacitance is the main choice for power

supply noise reduction in industry today. This is a proven methodology that typically uses theoretical noise models and approximations. The result is a solution which is not optimal as residual noise is left on the supply. This work presents a technique which is meant to assist the decoupling capacitance by providing for a methodology to account for the residual noise. This is done by increasing the apparent voltage headroom available to the digital circuitry via the use of an active noise cancellation structure. This structure was tested on an array of eight, 4-bit multipliers and is capable of increasing the headroom by 16.47 % when each multiplier block receives the same phase of the clock. The effectiveness of this technique will be verified using TSMC's 90 nm process."--Abstract.

In active noise control an artificially-generated secondary acoustic field is used to interfere destructively with the unwanted sound field. This book deals with the control engineering of generating this secondary field. This technique has uses in suppressing machinery noise in particular.

'The text is well written and supported by clear and useful illustrations. This would be a useful textbook for postgraduate or advanced undergraduate studies and would also make a good introductory text for engineers moving into the field. The literature survey and bibliography provide a useful starting point for further study.'The Aeronautical JournalActive Control of Aircraft Cabin Noise provides a bridge to fill the gap between robust control theory and practical applications of active noise control systems in aircraft cabin. Both the

possibilities and limitations of structural solutions to enhance aircraft cabin comfort by reducing interior noise are discussed supported by a wide range of topics in engineering, from finite element modeling to multichannel adaptive feed-forward control, usually dealt separately in the literature. In addition, experimental noise attenuation results with passengers' subjective perceptions predicting the effects of cabin noise on comfort assessments is examined. Theoretical and experimental research is detailed enough to capture the interest of the non-expert in engineering who wishes to have an overview of some of the active noise control applications in aircraft. This book may be used as an advanced textbook by graduate and undergraduate students in aeronautical engineering, and would be an authoritative resource book for research into the subject.
This second edition of Adaptive Filters: Theory andApplications has been updated throughout to reflect the latestdevelopments in this field; notably an increased coverage given tothe practical applications of the theory to illustrate the muchbroader range of adaptive filters applications developed in recentyears. The book offers an easy to understand approach to the theoryand application of adaptive filters by clearly illustrating how thetheory explained in the early chapters of the book is modified forthe various applications discussed in detail in later chapters.This integrated approach makes the book a valuable resource forgraduate students; and the inclusion of more advanced applicationsincluding antenna arrays and wireless communications makes it asuitable technical reference for engineers, practitioners

andresearchers. Key features: • Offers a thorough treatment of the theory of adaptivesignal processing; incorporating new material on transform domain,frequency domain, subband adaptive filters, acoustic echocancellation and active noise control. • Provides an in-depth study of applications which nowincludes extensive coverage of OFDM, MIMO and smart antennas. • Contains exercises and computer simulation problems atthe end of each chapter. • Includes a new companion website hosting MATLAB®simulation programs which complement the theoretical analyses,enabling the reader to gain an in-depth understanding of thebehaviours and properties of the various adaptive algorithms.

Noise and distortion that degrade the quality of speech signals can come from any number of sources. The technology and techniques for dealing with noise are almost as numerous, but it is only recently, with the development of inexpensive digital signal processing hardware, that the implementation of the technology has become practical. Noise Reduction in Speech Applications provides a comprehensive introduction to modern techniques for removing or reducing background noise from a range of speech-related applications. Self-contained, it starts with a tutorial-style chapter of background material, then focuses on system aspects, digital algorithms, and implementation. The final section explores a variety of applications and demonstrates to potential users of the technology the results

possible with the noise reduction techniques presented. The book offers chapters contributed by international experts, a practical, systems approach, and numerous references. For electrical, acoustics, signal processing, communications, and bioengineers, Noise Reduction in Speech Applications is a valuable resource that shows you how to decide whether noise reduction will solve problems in your own systems and how to make the best use of the technologies available.

By providing all the basic knowledge needed to assess how useful active noise control will be for a given problem, this book assists in the designing, setting up, and tuning of an active noise-control system. Written for students who have no prior knowledge of acoustics, signal processing, or noise control but who do have a reasonable grasp of basic physics and mathematics, the text is short and descriptive, leaving all mathematical details and proofs concerning vibrations, signal processing and the like to more advanced texts or research monographs. The book can thus be used in independent study, in a classroom with laboratories, or in conjunction with a kit for experiment or demonstration. Topics covered include basic acoustics, human perception and sound, sound intensity and related concepts, fundamentals of passive noise- control strategies, basics of digital systems and adaptive controllers, and active noise

control systems.

The authors' practical design is based on the concept of a continuously operating microphone (or group of microphones) sampling the environment and a speaker (or group of speakers) producing interfering waves that will cancel unwanted noise. (Technology & Industrial Arts)

This report describes the Active Noise Cancellation (ANC) System designed by General Electric and tested in the NASA Lewis Research Center's (LERC) 48 inch Active Noise Control Fan (ANCF). The goal of this study is to assess the feasibility of using wall mounted secondary acoustic sources and sensors within the duct of a high bypass turbofan aircraft engine for global active noise cancellation of fan tones. The GE ANC system is based on a modal control approach. A known acoustic mode propagating in the fan duct is canceled using an array of flush-mounted compact sound sources. The canceling modal signal is generated by a modal controller. Inputs to the controller are signals from a shaft encoder and from a microphone array which senses the residual acoustic mode in the duct. The key results are that the (6,0) was completely eliminated at the 920 Hz design frequency and substantially reduced elsewhere. The total tone power was reduced 6.8 dB (out of a possible 9.8 dB). Farfield reductions of 15 dB (SPL) were obtained. The (4,0) and (4,1) modes were reduced

simultaneously yielding a 15 dB PWL decrease. The results indicate that global attenuation of PWL at the target frequency was obtained in the aft quadrant using an ANC actuator and sensor system totally contained within the duct. The quality of the results depended on precise mode generation. High spillover into spurious modes generated by the ANC actuator array caused less than optimum levels of PWL reduction. The variation in spillover is believed to be due to calibration procedure, but must be confirmed in subsequent tests. Pla, Frederic G. and Hu, Ziqiang and Sutliff, Daniel L. Glenn Research Center...

This Phase I study demonstrated the basic feasibility of developing a hybrid active/passive noise canceling stethoscope for rotorcraft aeromedical evacuation use. The hybrid design makes full use of active and passive noise reduction techniques, and incorporates: (1) primary and reference stethoscopes to pickup the relevant patient sounds and to measure the surrounding ambient noise environment; (2) a hybrid noise canceling headset used by the medic to listen to the transduced heart/lung sounds and to reduce the ambient noise levels; and (3) a custom ANC processor to further reduce noise pickup at the primary stethoscope. Under the Phase I effort we reviewed commercially-available hardware, assembled candidate components in a prototype system, developed

custom ANC algorithms for patient signal processing, and demonstrated end-to-end operation of the system. Engineering evaluations of noise reduction capability and psychoacoustic evaluations of patient sound clarity were made to demonstrate system feasibility and to identify system requirements for full-scope prototype development under a follow-on program. The Phase I evaluation clearly demonstrated the system's ability to extract clean patient sounds in high ambient level noise, in situations in which one would normally experience inaudible patient sounds using conventional or electronic stethoscopes. Stethoscope, Active Noise Cancellation, Medevac, Noise, Auscultation Device, SBIR, Phase I, RAD II.

Understanding Active Noise Cancellation Provides a concise introduction to the fundamentals and applications of active control of vibration and sound for the non-expert. It is also a useful quick reference for the specialist engineer. The book emphasises the practical applications of technology, and complex control algorithms and structures are only discussed to the extent that they aid understanding. Extensive recommendations for further reading on the subject are provided, but the text will stand alone for those seeking an overview of the key issues: fundamentals, control systems, transducers, applications and possible future directions.