Advanced Applications in Acoustics, Noise and Vibration

Edited by Frank Fahy and John Walker

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Contents

	Preface List of contributors Acknowledgements	vii ix xiv
P. S	ART I ignal processing	
1	Signal processing techniques p.r. white and J.K. HAMMOND	3
P. A	ART II coustic modelling	51
2	Numerical methods in acoustics M. PETYT AND C.J.C. JONES	53
3	Source identification and location P.A. NELSON	100
4	Modelling of sound propagation in the ocean P.R. WHITE	154
P# Ei	ART III nvironmental and industrial acoustics	181
5	Environmental noise management I.H. FLINDELL AND J.G. WALKER	183

vi Contents

		NAME AND ADDRESS OF TAXABLE PARTY.
6	Vehicle noise	236
7	Aircraft noise	
· ·	P.F. JOSEPH AND M.G. SMITH	292
8	Active noise control S.J. ELLIOTT AND P.A. NELSON	347
PA	RTIV	
Vit	oration	387
9	Mobility and impedance methods in structural dynamics	389
	P. GARDONIO AND M.J. BRENNAN	
10	Finite element techniques for structural vibration M. PETYT AND P. GARDONIO	448
11	High-frequency structural vibration R.S. LANGLEY AND F.J. FAHY	490
12	Vibration control M.J. BRENNAN AND N.S. FERGUSON	530
13	Vibration measurement techniques using laser technology: laser vibrometry and TV holography N.A. HALLIWELL AND J.N. PETZING	581
	Index	633

Preface

F.J. Fohy and J.G. Walker

This book is a companion volume to Fundamentals of Noise and Vibration published in 1998, which was based upon material presented in the first semester course of the one-year ISVR postgraduate Masters programme 'Sound and Vibration Studies' and was essentially pedagogic in form, content and purpose. This successor is based partly on material covered in a selection of elective modules in the second semester of the Masters programme and partly on material presented in the annual ISVR short course 'Advanced Course in Acoustics, Noise and Vibration'. The principal aim is to provide comprehensive and up-to-date overviews of knowledge, applications and research activities in a range of topics that are of current interest in the practice of Engineering Acoustics and Vibration Technology. Naturally, the selection of topics reflects particular academic interests and expertise of members of the ISVR, together with those of some external associates.

As the title of the book indicates, the authors have, in general, artempted to emphasise applied aspects of the subjects of their chapters. However, the focus of those chapters that represent modules of the Masters course is biased towards instruction in the concepts, principles and techniques that underlie the technology of the topics addressed. Although this is not a textbook, its origins naturally lend it a tutorial element, albeit of an advanced nature, that is largely absent from technical handbooks, journal papers and the proceedings of specialist conferences. Consequently, it is anticipated that academics will find selected chapters suitable to support programmes of advanced instruction in various topics that are represented. The combination of expositions of underlying principles, phenomenological aspects, theoretical models and methods of analysis, and experimental methodology, together with comprehensive reference to current research and recent published material, should also appeal to the reader who is seeking an entrée into unfamiliar areas of sound and vibration technology. This is not a handbook in that it does not provide the engineer with readily applied sets of data and recipes for "instant' solutions to problems.

A multi-authored book inevitably lacks the uniformity of style of a single author volume. We have endeavoured to promote coherence and consistency by cross-referencing between chapters where appropriate. This editorial task was considerably easier in the case of the first book, since the form and content of the first semester introductory element of the Masters course has evolved over 50 years of presentation to, and feedback from, students who were mostly new to the subject. The matter of mathematical notation has proved to be particularly problematic. Complete uniformity has proved to be impracticable on account of the diversity of conventions and symbols employed in the various specialisations represented in the book. For this reason, symbols specific to each chapter are defined at the appropriate place in the text. However, the complex phasor representation of timeharmonic variation $e^{j\omega t}$ is used throughout the book. Readers should note this convention in relation to time derivatives, mobilities, impedances and other functions of complex quantities. Bold type is used to indicate vector quantities.