FUNDAMENTALS OF ACOUSTICS

Fourth Edition

LAWRENCE E. KINSLER Late Professor Emeritus Naval Postgraduate School

AUSTIN R. FREY Late Professor Emeritus Naval Postgraduate School

ALAN B. COPPENS **Black Mountain** North Carolina

JAMES V. SANDERS Associate Professor of Physics Naval Postgraduate School



John Wiley & Sons, Inc.

New York

Chichester

Weinheim Brisbane

Singapore Toronto

DOCKE RM Δ

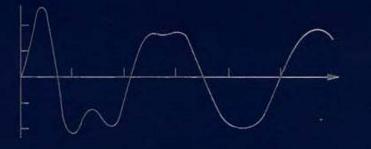
Δ

Find authenticated court documents without wa

Samsung v. Jawbone IPR2022-01321 Exhibit 1017

Fundamentals of Acoustics

FOURTH EDITION



Lawrence E. Kinsler Austin R. Frey Alan B. Coppens James V. Sanders

Δ

Find authenticated court documents without watermarks at docketalarm.com.

GLOSSARY OF SYMBOLS

This list identifies some symbols that are not necessarily defined every time they appear in the text.

а	acceleration; absorption	ď	detectability index
	coefficient (dB per	D	directivity; dipole strength
	distance); Sabine	DI	directivity index
	absorptivity	DNL	detected noise level
a_E	random-incidence energy	DNL DT	
	absorption coefficient		detection threshold
Α	sound absorption	Ŋ	diffraction factor
AG	array gain	е	specific energy
b	loss per bounce; decay	Ε	total energy
	parameter	E_k	kinetic energy
$b(heta, \phi)$	beam pattern	E_p	potential energy
В	magnetic field;	EL	echo level
	susceptance	E	time-averaged energy
BL	bottom loss		density
B	adiabatic bulk modulus	\mathscr{E}_i	instantaneous energy
\mathfrak{B}_T	isothermal bulk modulus		density
С	speed of sound	f	instantaneous force;
Cg	group speed		frequency (Hz)
C _p	phase speed	f_r	resonance frequency
Ċ	electrical capacitance;	fu, fi	upper, lower half-power
	acoustic compliance;		frequencies
	heat capacity	F	peak force amplitude;
$C_{\mathscr{P}}$	heat capacity at constant		frequency (kHz)
	pressure	F_e	effective force amplitude
Сŷ	specific heat at constant	8	spectral density of a
	pressure		transient function;
C_V	heat capacity at constant		sound-speed gradient;
	volume		acceleration of gravity;
c_V	specific heat at constant	-	aperture function
	volume	G	conductance
CNEL	community noise	G	adiabatic shear modulus
	equivalent level (dBA)	h	specific enthalpy
d	detection index	Ц(А Ж)	directional factor

DOCKET A L A R M Find a

Find authenticated court documents without watermarks at <u>docketalarm.com</u>.

DOCKET ALARM Find authenticated court documents without watermarks at <u>docketalarm.com</u>.

.

With grateful thanks to our wives, Linda Miles Coppens and Marilyn Sanders, for their unflagging support and gentle patience.

ACQUISITIONS EDITOR Stuart Johnson MARKETING MANAGER Sue Lyons PRODUCTION EDITOR Barbara Russiello SENIOR DESIGNER Kevin Murphy ELECTRONIC ILLUSTRATIONS Publication Services, Inc.

This book was set in 10/12 Palatino by Publication Services, Inc. and printed and bound by Hamilton Press. The cover was printed by Hamilton Press.

This book is printed on acid-free paper.

Copyright 2000© John Wiley & Sons, Inc. All rights reserved.

No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, scanning or otherwise, except as permitted under Sections 107 or 108 of the 1976 United States Copyright Act, without either the prior written permission of the Publisher, or authorization through payment of the appropriate per-copy fee to the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923, (508) 750-8400, fax (508) 750-4470. Requests to the Publisher for permission should be addressed to the Permissions Department, John Wiley & Sons, Inc., 605 Third Avenue, New York, NY 10158-0012, (212) 850-6011, fax (212) 850-6008, E-mail: PERMREQ@WILEY.COM. To order books or for customer service please call 1(800)-225-5945.

Library of Congress Cataloging-in-Publication Data:
Fundamentals of acoustics / Lawrence E. Kinsler. . . [et al.].-4th ed. p.cm. Includes index.
1. Sound-waves. 2. Sound-Equipment and supplies. 3. Architectural acoustics. I. Kinsler, Lawrence E.

QC243 .F86 2000 534-dc21 ISBN 0-471-84789-5 Printed in the United States of America 10 9 8 7 6 5 4 3 2

DOCKE.

99-049667

DOCKET A L A R M



Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.