

CONTENTS

LIST OF CONTRIBUTORS	vii
PREFACE	ix

1

A History of Ultrasonics

KARL F. GRAFF

I. INTRODUCTION	2
II. HIGH-FREQUENCY ACOUSTICS IN THE 19TH CENTURY	3
III. EARLY WORK IN THE 20TH CENTURY (1900–1915)	20
IV. BIRTH AND GROWTH OF ULTRASONICS (1916–1926)	28
V. INTENSE ULTRASOUND AND OTHER DEVELOPMENTS (1927–1939)	41
VI. ULTRASONICS COMES OF AGE (1940–1955)	60
VII. TO THE PRESENT	89
REFERENCES	90

2

Circuit-Model Analysis and Design of Interdigital Transducers for Surface Acoustic Wave Devices

W. RICHARD SMITH

I. INTRODUCTION	100
II. GENERAL DESCRIPTION OF INTERDIGITAL TRANSDUCERS AS FILTER ELEMENTS	102
III. RELATION OF TRANSDUCER RESPONSE TO GEOMETRY	110
IV. "SECOND-ORDER" EFFECTS AND THEIR COMPENSATION	122
V. THREE-PORT CIRCUIT MODEL DESCRIPTION OF INTERDIGITAL TRANSDUCERS	132

VI. MATCHING-CIRCUIT-CONTROLLED TRADE-OFFS AMONG INSERTION LOSS, BANDWIDTH, TRIPLE TRANSIT SUPPRESSION, AND VOLTAGE STANDING-WAVE RATIO	160
VII. SPECIFIC TRANSDUCER GEOMETRIES (ARRAY FACTORS) FOR TYPICAL FILTER APPLICATIONS	177
REFERENCES	187

3

Theory of Resonance Scattering

LAWRENCE FLAX, GUILLERMO C. GAUNAURD,
AND HERBERT ÜBERALL

I. INTRODUCTION	191
II. ACOUSTIC-WAVE SCATTERING FROM ELASTIC TARGETS	193
III. ELASTIC-WAVE SCATTERING FROM CAVITIES AND INCLUSIONS	240
IV. THE INVERSE SCATTERING PROBLEM	281
V. RESONANCES IN ELECTROMAGNETIC SCATTERING	285
REFERENCES	292

4

Acoustic Emission—An Update

ARTHUR E. LORD, JR.

INTRODUCTION	295
I. DETERMINATION OF ACOUSTIC EMISSION SOURCE CHARACTERISTICS	297
II. OPTICAL DETECTION OF ACOUSTIC EMISSIONS	334
III. SIGNAL ANALYSIS	334
IV. ACOUSTIC EMISSION DURING VARIOUS TRANSFORMATIONS	335
V. DISLOCATION EFFECTS	340
VI. MAGNETOMECHANICAL ACOUSTIC EMISSION	342
VII. MONITORING FATIGUE DAMAGE WITH ACOUSTIC EMISSION	348
VIII. PRACTICAL APPLICATIONS	350
IX. DISCUSSION	353
REFERENCES	355
AUTHOR INDEX	361
SUBJECT INDEX	369
CONTENTS OF PREVIOUS VOLUMES	379