

---

# Contents

## 0 A Unified Approach to Finite and Boundary Element Discretization in Linear Time–Harmonic Acoustics

- S. Marburg, B. Nolte* ..... 1

---

### Part I FEM: Numerical Aspects

#### 1 Dispersion, Pollution, and Resolution

- I. Harari* ..... 37

#### 2 Different Types of Finite Elements

- G. Cohen, A. Hauck, M. Kaltenbacher, T. Otsuru* ..... 57

#### 3 Multifrequency Analysis using Matrix Padé–via–Lanczos

- J. P. Tuck–Lee, P. M. Pinsky, H. L. Liew* ..... 89

#### 4 Computational Aeroacoustics based on Lighthill’s Acoustic Analogy

- M. Kaltenbacher, M. Escobar, S. Becker, I. Ali* ..... 115

---

### Part II FEM: External Problems

#### 5 Computational Absorbing Boundaries

- D. Givoli* ..... 145

#### 6 Perfectly Matched Layers

- A. Bermúdez, L. Hervella–Nieto, A. Prieto, R. Rodríguez* ..... 167

#### 7 Infinite Elements

- R. J. Astley* ..... 197

#### 8 Efficient Infinite Elements based on Jacobi Polynomials

- O. von Estorff, S. Petersen, D. Dreyer* ..... 231

---

### Part III FEM: Related Problems

**9 Fluid–Structure Acoustic Interaction***A. Bermúdez, P. Gamallo, L. Hervella–Nieto, R. Rodríguez, D. Santamarina . . . . .* 253**10 Energy Finite Element Method***R. Bernhard, S. Wang . . . . .* 287

---

**Part IV BEM: Numerical Aspects****11 Discretization Requirements: How many Elements per Wavelength  
are Necessary?***S. Marburg . . . . .* 309**12 Fast Solution Methods***T. Sakuma, S. Schneider, Y. Yasuda . . . . .* 333**13 Multi–domain Boundary Element Method in Acoustics***T. W. Wu . . . . .* 367**14 Waveguide Boundary Spectral Finite Elements***A. Peplow . . . . .* 387

---

**Part V BEM: External Problems****15 Treating the Phenomenon of Irregular Frequencies***S. Marburg, T. W. Wu . . . . .* 411**16 A Galerkin-type BE–formulation for Acoustic Radiation and  
Scattering of Structures with Arbitrary Shape***Z. S. Chen, G. Hofstetter, H. Mang . . . . .* 435**17 Acoustical Radiation and Scattering above an Impedance Plane***M. Ochmann, H. Brick . . . . .* 459**18 Time Domain Boundary Element Method***S. Langer, M. Schanz . . . . .* 495

---

**Part VI BEM: Related Problems****19 Coupling a Fast Boundary Element Method with a Finite Element  
Formulation for Fluid–Structure Interaction***L. Gaul, D. Brunner, M. Junge . . . . .* 519**20 Inverse Boundary Element Techniques for the Holographic  
Identification of Vibro–Acoustic Source Parameters***J.–G. Ih . . . . .* 547**Index . . . . .** 573