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2.10.3 Level Difference, LD2.10.4 Comparison of the Three Performance Parameters; 2.11 Lumped-Element Representations of a Tube; 2.12 Simple Area Discontinuities; 2.13 Gradual Area Changes; 2.13.1 Conical Tube; 2.13.2 Exponential Tube; 2.13.3 Elliptical Tube; 2.14 Extended-Tube Resonators; 2.15 Helmholtz Resonator; 2.16 Concentric Hole-Cavity Resonator; 2.17 An Illustration of the Classical Method of Filter Evaluation; 2.18 The Transfer Matrix Method; 2.18.1 De.nition of Transfer Matrix; 2.18.2 Transfer Matrix of a Uniform Tube; 2.18.3 A General Method for Derivation of Transfer Matrix
2.18.4 Transfer Matrices of Lumped Elements2.18.5 Transfer Matrices of Variable Area Tubes; 2.18.6 Overall Transfer Matrix of the System; 2.18.7 Evaluation of TL in Terms of the Four-Pole Parameters; 2.19 TL of a Simple Expansion Chamber Muffler; 2.20 An Algebraic Algorithm for Tubular Mufflers; 2.20.1 Development of the Algorithm; 2.20.2 Formal Enunciation and Illustration of the Algorithm; 2.21 Synthesis Criteria for Low-Pass Acoustic Filters; References; 3. Flow-Acoustic Analysis of Cascaded-Element Mufflers; 3.1 The Exhaust Process; 3.2 Finite Amplitude Wave Effects
3.3 Mean Flow and Acoustic Energy Flux3.4 Aeroacoustic State Variables; 3.5 Aeroacoustic Radiation; 3.6 Insertion Loss; 3.7 Transfer Matrices for Tubular Elements; 3.7.1 Uniform Tube; 3.7.2 Extended-Tube Elements; 3.7.3 Simple Area Discontinuities; 3.7.4 Physical Behavior of Area Discontinuities; 3.8 Perforated Elements with Two Interacting Ducts; 3.8.1 Concentric-Tube Resonator; 3.8.2 Cross-Flow Expansion Element; 3.8.3 Cross-Flow Contraction Element; 3.8.4 Some Remarks; 3.9 Acoustic Impedance of Perforates; 3.10 Matrizant Approach; 3.11 Perforated Elements with Three Interacting Ducts
3.11.1 Three-Duct Cross-Flow Expansion Chamber Element

Sommario/riassunto

"Fully updated second edition of the premier reference book on muffler and lined duct acoustical performanceEngine exhaust noise pollutes the street environment and ventilation fan noise enters dwellings along with fresh air. People have become conscious of their working environment. Governments of most countries have responded to popular demand with mandatory restrictions on sound emitted by automotive engines, and a thorough knowledge of acoustics of ducts and mufflers is needed for the design of efficient muffler configurations. This fully updated Second Edition of Acoustics of Ducts and Mufflers deals with propagation, reflection and dissipation/absorption of sound along ducts/pipes/tubes, area discontinuities, perforated elements and absorptive linings that constitute the present-day mufflers and silencers designed to control noise of exhaust and intake systems of automotive engines, diesel-generator sets, compressors and HVAC systems.It includes equations, figures, tables, references, and solved examples and unsolved exercises with answers, so it can be used as a text book as well as a reference book. It also offers a complete presentation and analysis of the major topics in sound suppression and noise control for the analysis and design of acoustical mufflers, air conditioning and ventilation duct work. Both the fundamentals and the latest technology are discussed, with an emphasis on applications. Deals with reactive mufflers, dissipative silencers, the frequency-domain approach, and the time-domain approach. Fully updated second edition of the premier reference book on muffler and lined duct acoustical performance, in one complete volume Presents original new research on topics including baffle silencers and louvers, 3D analytical techniques, and flow-acoustic analysis of multiply-connected perforated-element mufflers Includes a general design procedure to help muffler designers in the automotive industry, exhaust noise being a major component of

automobile and traffic noise pollution Written by an expert with four decades' experience in teaching to graduate students, publishing extensively in reputed international journals, and consulting with industry for noise control as well as designing for quietness "--