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Files Included with This Book

A.1 Table of Files Included with This Book

The following table lists the MATLAB scripts, ANSYS WORKBENCH archive files, and ANSYS Mechanical APDL scripts that are included with this book.

Section, Page No.	Filename / Description
Chapter 2 Background	
Sec 2.12, p. 99	<code>impedance_driven_closed_pipe.m</code> This MATLAB script is used to calculate the mechanical impedance of a piston attached to the end of a closed duct. The script is used to highlight the scaling that is needed to be applied to a 1/4 acoustic finite model to calculate the results for a full model.
Chapter 3 Ducts	
Sec 3.3.1, p. 107	<code>res_freqs_duct.wbpz</code> ANSYS WORKBENCH model of a circular duct used to calculate the resonance frequencies.
Sec 3.3.2, p. 130	<code>res_freqs_duct_FLUID220.wbpz</code> ANSYS WORKBENCH model of a circular duct used to calculate the resonance frequencies, meshed with FLUID220 elements.
Sec 3.3.4, p. 138	<code>driven_duct_pres_dist.wbpz</code> ANSYS WORKBENCH model of a circular duct with a normal surface velocity excitation at one end, which simulates a piston, and a rigid termination at the other, that is meshed with FLUID30 elements, and is used to calculate the sound pressure levels and acoustic particle velocities along the duct.

Section, Page No.	Filename / Description
Sec 3.3.5, p. 144	<code>spl_along_duct_4pole.m</code> This MATLAB script can be used to calculate the sound pressure and acoustic particle velocity along a circular duct using the four-pole transmission matrix method.
Sec 3.3.7.2, p. 149	<code>radiation_open_duct.wbpz</code> ANSYS WORKBENCH model of a duct with a piston on one end and a hemispherical volume on the other end that is used to simulate a plane baffle (hemispherical free-field). The solid model contains the whole geometry, however many of the bodies are Suppressed, so that only 1/4 of the model is shown and analyzed. The piston face is driven with a harmonic force of 1×10^{-3} N and the resulting displacement of the piston is calculated by the harmonic response analysis. The results can be exported to MATLAB and used to calculate the piston velocity, mechanical impedance, and mechanical power, and compared with theoretical predictions with the MATLAB script <code>radiation_end_of_pipe.m</code> .
Sec 3.3.7.3, p. 161	<code>radiation_end_of_pipe.m</code> Script to calculate the mechanical impedance of a piston attached to a duct that radiates into a plane baffle (hemispherical free-field). The script calculates the real and imaginary parts of the mechanical impedance and the mechanical power into the piston.
Sec 3.3.7.4, p. 162	<code>freq_depend_impedance.wbpz</code> This ANSYS WORKBENCH archive file contains a model of a duct with a piston on one end and an impedance on the other end that varies with frequency and is used to simulate radiation into a plane baffle (hemispherical free-field). The impedance is implemented using the APDL command <code>SF, ,IMPD</code> inside a command object within the WORKBENCH model.

Section, Page No.	Filename / Description
Sec 3.3.7.4, p. 163	<p><code>freq_depend_imp_commands.txt</code></p> <p>APDL code to be inserted into a command object under the Harmonic Response (A5) branch in the ANSYS WORKBENCH model <code>freq_depend_impedance.wbpz</code>. The APDL code is used to create a rigid piston face on the named selection NS_INLET, calculates the values for the real and imaginary specific acoustic impedance of a flanged duct radiating into a plane baffle (hemispherical free-field), applies the impedance to the named selection NS_OUTLET, and conducts a harmonic response analysis.</p>
Sec 3.4.2.2, p. 170	<p><code>beranek_ver_fig10_11_quarter_wave_tube_duct_4_pole.m</code></p> <p>This MATLAB script is used to generate Figures 10 and 11 from Beranek and Vér [46, p. 384] of the predicted transmission loss of a transverse tube, or quarter-wave tube, resonator for a range of area ratios of the quarter-wave tube to main duct.</p>
Sec 3.4.2.3, p. 171	<p><code>quarter_wave_tube.wbpz</code></p> <p>This ANSYS WORKBENCH archive file contains a model of a quarter-wave tube that is attached to a circular main exhaust duct and is used to calculate the transmission loss. Many of the dimensions of the duct have been parameterized to expedite analyses of various ratios of the quarter-wave tube to main duct diameters, and angle of inclination.</p>
Sec 3.4.3.2, p. 188	<p><code>beranek_ver_fig10_12_single_chamber_4_pole.m</code></p> <p>This MATLAB script is used to calculate the transmission loss of an expansion chamber silencer using the four-pole transmission matrix method. The script can be used to reproduce the Beranek and Vér [46, Fig. 10.12, p. 386]</p>
Sec 3.4.3.3, p. 189	<p><code>duct_expansion_chamber.wbpz</code></p> <p>This ANSYS WORKBENCH archive file contains a model of a single expansion chamber silencer. The model is used to calculate the transmission loss of the silencer.</p>

Section, Page No.	Filename / Description
Sec 3.5, p. 194	<code>nonplane_wave_duct.wbpz</code> This ANSYS WORKBENCH archive file contains a model of a rectangular duct where non-plane wave conditions can exist. The model is used to demonstrate the effect that an irregular mesh can trigger non-plane waves.
Sec 3.6.2, p. 204	<code>temp_gradient_spl_along_duct_4pole_sujith.m</code> This MATLAB script is used to calculate the sound pressure and acoustic particle velocity in a duct with a linear temperature gradient, using the four-pole transmission matrix method.
Sec 3.6.3, p. 205	<code>temp_grad_duct.wbpz</code> This ANSYS WORKBENCH model is used to conduct a static thermal analysis of a duct with fixed temperature boundary conditions at each end. An acoustic analysis is then conducted where the nodal temperatures are imported and applied as nodal body force loads. A harmonic analysis is conducted to calculate the sound pressure and acoustic particle velocity in a duct with a linear temperature gradient. The model can also be used to calculate the sound pressure distribution in the duct for a constant temperature profile in the duct.
Sec 3.6.4, p. 220	<code>duct_temp_grad.inp</code> This ANSYS MECHANICAL APDL script is used to conduct a harmonic analysis to calculate the sound pressure and acoustic particle velocity in a circular duct with a piston at one end and a rigid termination at the other. The gas has a linear temperature distribution between the ends of the duct.

Chapter 4 Sound Inside a Rigid-Walled Cavity

Sec 4.4.1, p. 228	<code>rigid_wall_cavity.m</code> This MATLAB script is used to model a rigid-walled rectangular acoustic cavity to conduct a modal analysis to determine the resonance frequencies of the cavity, and a modal superposition harmonic analysis to calculate the sound pressure in the cavity due to an acoustic point source.
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Section, Page No.	Filename / Description
Sec 4.4.2, p. 229	<code>rigid_cav.wbpz</code> This ANSYS WORKBENCH archive file contains a model of a rigid-walled rectangular acoustic cavity. Modal and harmonic analyses are conducted using the full method to calculate the sound pressure in the cavity due to an acoustic mass source.
Sec 4.4.3, p. 246	<code>rigid_cavity_full.inp</code> This ANSYS MECHANICAL APDL script is used to model a rigid-walled rectangular acoustic cavity to conduct a harmonic analysis using the full method to calculate the sound pressure in the cavity due to an acoustic mass source.
Sec 4.4.3, p. 247	<code>rigid_cavity_modal_super.inp</code> This ANSYS MECHANICAL APDL script is used to model a rigid-walled rectangular acoustic cavity to conduct a harmonic analysis using the modal superposition method to calculate the sound pressure in the cavity due to an acoustic point source modeled using the APDL command <code>F,node,FLOW,q</code> . Note that a mass source <code>BF,node,JS,mass_source</code> cannot be used to model the acoustic excitation for modal superposition analyses.

Chapter 5 Introduction to Damped Acoustic Systems

Sec 5.5.4, p. 273	<code>impedance_tube.m</code> This MATLAB script is used to analyze the response of a one-dimensional waveguide with an arbitrary boundary admittance opposite a plane-wave source. The script calculates the pressure response in the duct and uses the two-microphone method to estimate the surface impedance, complex reflection coefficient, and sound absorption coefficient. The script also analyzes the results from ANSYS MECHANICAL APDL.
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Section, Page No.	Filename / Description
Sec 5.5.5, p. 273	<p><code>code_ansys_impedance_tube.txt</code></p> <p>This ANSYS MECHANICAL APDL script is used generate an FE model of a lined duct using the 2D FLUID29 acoustic elements with a real admittance at one end, as well as conduct a harmonic analysis using the full method. The impedance is activated using <code>SF, , IMPD, 1</code> and the admittance is defined using <code>MP, MU, , Admittance</code>. The file also includes additional code to write the ANSYS results to a text file, as well as the code for generating plots of key results.</p>
Sec 5.6.2, p. 281	<p><code>impedance_surf153.m</code></p> <p>This MATLAB script is used to analyze the response of a one-dimensional waveguide with an arbitrary boundary impedance opposite a plane-wave source. The script calculates the pressure response in the duct and uses the two-microphone method to estimate the surface impedance, complex reflection coefficient and sound absorption coefficient. The script also analyzes the results from ANSYS MECHANICAL APDL.</p>
Sec 5.6.2, p. 281	<p><code>code_ansys_surf153.txt</code></p> <p>This ANSYS MECHANICAL APDL script is used generate a FE model of a lined duct using the 2D FLUID29 acoustic elements with an arbitrary complex impedance at one end, as well as conduct a harmonic analysis using the full method. The impedance is achieved using the SURF153 surface effect element. The file also includes additional code to write the ANSYS results to a text file, as well as the code for generating plots of key results.</p>
Sec 5.9.3, p. 307	<p><code>plane_wave_viscous_losses.m</code></p> <p>This MATLAB script is used to calculate the expected classical attenuation in a duct. Using the expressions derived in Section 5.9.1 the attenuation per unit length is calculated using Equations (5.49) and (5.47). The script also analyzes the results from ANSYS MECHANICAL APDL.</p>

Section, Page No.	Filename / Description
Sec 5.9.4, p. 307	<code>Visco-thermal.wbpj</code> This ANSYS WORKBENCH project file contains a model of a hard-walled duct with the visco-thermal losses activated. The file conducts a harmonic analysis using the full method. The acoustic attenuation per meter due to classical absorption is calculated.
Sec 5.9.5, p. 314	<code>code_ansys_visco_thermal.txt</code> This ANSYS MECHANICAL APDL script is used to generate an FE model of a rigid-walled duct using the quadratic FLUID220 acoustic elements; the appropriate material properties are defined, a mass source boundary condition is applied to one end, and an anechoic termination is applied to the other. A harmonic analysis is performed and the results are exported to a text file.
Sec 5.10.3, p. 317	<code>rigid_wall_cavity_damping.m</code> This MATLAB script is used to calculate the effect of spectral (global) damping on a rigid-walled rectangular cavity. The script is a modified version of the script <code>rigid_wall_cavity.m</code> presented previously. The script also analyzes the results from ANSYS WORKBENCH and ANSYS MECHANICAL APDL.
Sec 5.10.4, p. 317	<code>rigid_cavity_modal_super_damped.inp</code> This ANSYS MECHANICAL APDL script is used to generate an FE model of a rigid-walled rectangular cavity to which various forms of spectral damping are applied. The pressure response is calculated using harmonic analysis with the full option, and the results are exported to a text file for analysis by the MATLAB script <code>rigid_wall_cavity_damping.m</code> . This analysis is based on ANSYS MECHANICAL APDL file <code>rigid_cavity_modal_super.inp</code> .

Chapter 6 Sound Absorption in a Lined Duct

Sec 6.5.1, p. 338	<code>lined_duct.m</code> This MATLAB script is used to define the key parameters defined in Table 6.2, then using the expressions derived in Section 6.4.2 the attenuation per unit length is calculated using Equations (6.9), (6.10), and (6.11). The script also analyzes the results from ANSYS WORKBENCH and ANSYS MECHANICAL APDL.
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Section, Page No.	Filename / Description
Sec 6.6.1, p. 364	<code>scott.m</code> This MATLAB function is called by <code>lined_duct.m</code> when solving the transcendental equation used to calculate the absorption by a bulk reacting liner made from porous media.
Sec 6.5.2.1, p. 338	<code>Lined_Duct.wbpj</code> This ANSYS WORKBENCH project file contains a model of a duct, with a silencer section and anechoic termination. The section is modeled as both a locally reacting impedance using the <code>SF,,IMPD</code> command as well as a bulk reacting liner using the Johnson–Champoux–Allard equivalent fluid model. The file conducts a harmonic analysis using the full method. Inputs are both acoustic FLOW and mass sources, and output quantities of interest are sound pressures, sound pressure levels, and particle velocities.
Sec 6.5.3, p. 357	<code>code_ansys_lined_duct.txt</code> This ANSYS MECHANICAL APDL script is used generate a finite element model of a lined duct, as well as conduct a harmonic analysis using the full method. The file also includes additional code to write the ANSYS results to a text file, as well as the code for generating plots of key results.

Chapter 7 Room Acoustics

Sec 7.4.1.1, p. 380	<code>Sabine.m</code> This MATLAB script can be used to calculate the modal density, modal overlap, frequency bounds, and reverberation time using the equations in Section 7.3 as well as post-process the ANSYS WORKBENCH and ANSYS MECHANICAL APDL results.
Sec 7.4.1.2, p. 380	<code>Sabine.wbpj</code> This ANSYS WORKBENCH project file contains a model of a reverberation room, comprised of a rigid-walled rectangular acoustic cavity that is lined on one surface with a sound-absorbing material. The file conducts undamped and damped model analysis, a harmonic analysis using the full method, as well as a transient analysis using the full method. Inputs are both acoustic FLOW and Mass Source, and output quantities of interest are sound pressures and sound pressure levels.

Section, Page No.	Filename / Description
Sec 7.4.1.3, p. 393	<code>code_ansys_sabine.txt</code> This ANSYS MECHANICAL APDL script is used to model a reverberation room, comprised of a rigid-walled rectangular acoustic cavity that is lined on one surface with a sound-absorbing material. The file conducts undamped and damped model analysis, a harmonic analysis using the full method, as well as a transient analysis using the full method. Inputs are both acoustic FLOW and Mass Source, and output quantities of interest are sound pressures and sound pressure levels.

Chapter 8 Radiation and Scattering

Sec 8.3, p. 436	<code>acoustic_sources_PML.wbpz</code> This ANSYS WORKBENCH archive file is used to plot the directivity of Acoustic Wave Sources, Monopole, Dipole, back-enclosed loudspeaker, and Bare Loudspeaker.
Sec 8.3.1, p. 441	<code>monopole_spl_vs_angle.m</code> This MATLAB code can be used to calculate the sound pressure level versus angle for a monopole source radiating into a free-field.
Sec 8.3.4, p. 455	<code>dipole_spl_vs_angle.m</code> This MATLAB code can be used to calculate the sound pressure level versus angle for a dipole source radiating into a free-field.
Sec 8.4.3, p. 460	<code>pressure_on_axis.m</code> This MATLAB code can be used to calculate the pressure on the axis of symmetry radiated from a baffled circular piston.
Sec 8.4.3, p. 460	<code>baffled_piston.m</code> This MATLAB code can be used to calculate the normalized impedance of a vibrating baffled circular piston.
Sec 8.4.3, p. 460	<code>struve.m</code> This MATLAB function can be used to calculate the Struve function.
Sec 8.4.3, p. 462	<code>radiation_pattern_baffled_piston.m</code> This MATLAB code can be used to calculate the beam pattern or directivity of a vibrating baffled circular piston.

Section, Page No.	Filename / Description
Sec 8.4.4, p. 465	<code>piston.baffle_axisym.wbpz</code> This ANSYS WORKBENCH archive file contains a model of an axi-symmetric piston radiating into an infinite plane baffle.
Sec 8.4.4, p. 481	<code>command_obj_solid_geom_01.txt</code> This file contains APDL code that can be copied into a command object in the ANSYS WORKBENCH model of an axi-symmetric piston radiating into an infinite plane baffle.
Sec 8.4.4, p. 482	<code>command_obj_solid_geom_02.txt</code> This file contains APDL code that can be copied into a command object in the ANSYS WORKBENCH model of an axi-symmetric piston radiating into an infinite plane baffle.
Sec 8.4.4, p. 482	<code>command_obj_solid_geom_03.txt</code> This file contains APDL code that can be copied into a command object in the ANSYS WORKBENCH model of an axi-symmetric piston radiating into an infinite plane baffle.
Sec 8.4.4, p. 491	<code>command_obj_harmonic_A5_01.txt</code> This file contains APDL code that can be copied into a command object in the ANSYS WORKBENCH model of an axi-symmetric piston radiating into an infinite plane baffle.
Sec 8.4.4, p. 499	<code>command_obj_harmonic_A5_02.txt</code> This file contains APDL code that can be copied into a command object in the ANSYS WORKBENCH model of an axi-symmetric piston radiating into an infinite plane baffle.
Sec 8.4.4, p. 492	<code>command_obj_solution_A6_01.txt</code> This file contains APDL code that can be copied into a command object in the ANSYS WORKBENCH model of an axi-symmetric piston radiating into an infinite plane baffle.
Sec 8.4.4, p. 499	<code>command_obj_solution_A6_02.txt</code> This file contains APDL code that can be copied into a command object in the ANSYS WORKBENCH model of an axi-symmetric piston radiating into an infinite plane baffle.

Section, Page No.	Filename / Description
Sec 8.4.4, p. 505	command_obj_solution_A6_03.txt This file contains APDL code that can be copied into a command object in the ANSYS WORKBENCH model of an axi-symmetric piston radiating into an infinite plane baffle.
Sec 8.4.4, p. 506	power_freefield_2Dhemisphere.m This MATLAB code can be used to post-process the results exported from ANSYS of the sound pressure of FLUID129 elements on a circular arc to calculate the sound power radiated into a free-field. The MATLAB script will read the exported nodal pressures, node and element data, and material properties.
Sec 8.4.5, p. 507	baffled_piston.inp This ANSYS MECHANICAL APDL input file is used to generate an axi-symmetric (2D) model of a rigid circular piston vibrating in an infinite plane baffle. The code will calculate and plot the mechanical radiation impedance versus frequency of the piston. The code will reproduce Figure 7.5.2, p. 187 in Kinsler et al. [102].
Sec 8.4.5, p. 507	p_vs_d.inp This ANSYS MECHANICAL APDL input file is used to generate an axi-symmetric (2D) model of a rigid circular piston vibrating in an infinite plane baffle. The code will calculate and plot the on-axis sound pressure level versus distance from the piston. The graph is similar to Figure 7.4.2, p. 181 in Kinsler et al. [102], only the y-axis of the graph is the absolute value of pressure, rather than non-dimensionalized pressure.
Sec 8.6.3, p. 514	cylinder_plot_scattered_pressure.m This MATLAB code can be used to plot the scattered sound pressure level from an incident plane wave striking a cylinder.
Sec 8.6.4, p. 519	cylinder_scattering.wbpz This ANSYS WORKBENCH archive file can be used to calculate the scattered sound pressure level from an infinitely long cylinder when struck by an acoustic plane wave at an angle normal to the axis of the cylinder.

Section, Page No.	Filename / Description
Chapter 9 Fluid–Structure Interaction	
Sec 9.2.2, p. 533	<p>square_duct_plate.wbpz</p> <p>This ANSYS WORKBENCH archive file can be used to calculate the sound pressure level in a square duct that has anechoic end conditions and a thin flexible plate halfway along the duct.</p>
Sec 9.4.2, p. 561	<p>theory_couple_plate_cavity.m</p> <p>This MATLAB file is used to model the vibro-acoustic response of a simply supported plate attached to the end wall of a rectangular cavity. A harmonic point force acts on the plate and the acoustic response in the cavity is measured.</p>
Sec 9.4.3, p. 563	<p>fsi_plate_box.wbpz</p> <p>This ANSYS WORKBENCH archive file contains a model of a simply supported plate attached to the end wall of a rectangular cavity and structural and acoustic systems are coupled using fluid–structure interaction. The acoustic cavity is modeled with FLUID220 elements and the simply supported flexible panel on one end of the cavity is modeled with SHELL181 elements.</p>
Sec 9.4.4, p. 576	<p>box_plate.inp</p> <p>This ANSYS MECHANICAL APDL script is used to model an acoustic cavity with FLUID30 elements with a simply supported flexible panel on one end with SHELL181 elements, apply a point force to the plate, and conduct fluid–structure interaction full harmonic analysis.</p>
Sec 9.4.5, p. 580	<p>extract_modes.mac</p> <p>This ANSYS MECHANICAL APDL macro is used to calculate the resonance frequencies and mode shapes of a model with a structure comprising SHELL181 elements and acoustic cavity comprising FLUID30 elements. The results are saved to disk and require post-processing with MATLAB scripts to calculate the coupled vibro-acoustic response.</p>

Section, Page No.	Filename / Description
Sec 9.4.5, p. 580	<code>compare_modal_coupling_vs_full_FSI_press.m</code> This MATLAB script is used to process the results from the ANSYS MECHANICAL APDL analyses using the modal coupling theory described in Section 9.3.2 to calculate the sound pressure at a point within the cavity. This is compared with the results from conducting a full fluid–structure interaction harmonic analysis.
Sec 9.4.5, p. 582	<code>compare_modal_coupling_vs_full_FSI_disp.m</code> This MATLAB script is used to calculate the displacement of the plate at the driving point from ANSYS MECHANICAL APDL analyses using the modal coupling theory described in Section 9.3.2. This result is compared with the results from conducting a full fluid–structure interaction harmonic analysis. This script should only be run after using the MATLAB script <code>compare_modal_coupling_vs_full_FSI.m</code> .
Sec 9.4.5, p. 583	<code>ape_from_ansys.m</code> This MATLAB function is used to calculate acoustic potential energy from results exported by the ANSYS MECHANICAL APDL function <code>box_plate.inp</code> . The acoustic pressure at every node associated with FLUID30 elements and at every analysis frequency is imported and used to calculate the acoustic potential energy of the acoustic cavity.
Sec 9.4.5, p. 584	<code>ske_from_ansys.m</code> This MATLAB function is used to calculate structural kinetic energy from results exported by the ANSYS MECHANICAL APDL function <code>box_plate.inp</code> . The displacement at every node associated with SHELL181 elements and at every analysis frequency is imported and used to calculate the kinetic energy of the structure.
Sec 9.3, p. 579	<code>loadmodel.m</code> This MATLAB function is part of a group of functions to calculate the coupled vibro-acoustic response using modal coupling theory. This function loads the data that was exported from the ANSYS MECHANICAL APDL macro <code>export_modes.mac</code> .

Section, Page No.	Filename / Description
Sec 9.3, p. 579	loadstr.m This MATLAB function is part of a group of functions to calculate the coupled vibro-acoustic response using modal coupling theory. This function is called by <code>loadmodel.m</code> and loads the results from the structural analysis that was exported from the ANSYS MECHANICAL APDL macro <code>export_modes.mac</code> .
Sec 9.3, p. 579	loadcav.m This MATLAB function is part of a group of functions to calculate the coupled vibro-acoustic response using modal coupling theory. This function is called by <code>loadmodel.m</code> and loads the results from the acoustic analysis that was exported from the ANSYS MECHANICAL APDL macro <code>export_modes.mac</code> .
Sec 9.3, p. 579	bli.m This MATLAB function is part of a group of functions to calculate the coupled vibro-acoustic response using modal coupling theory. This function is used to calculate the coupling coefficient between the acoustic modes and the structural modes. It is called by the function <code>loadmodel.m</code> .
Sec 9.3, p. 579	plotmodel.m This MATLAB function is part of a group of functions to calculate the coupled vibro-acoustic response using modal coupling theory. This function can be used to plot the shape of the acoustic and structural models.
Sec 9.3, p. 579	plotmode.m This MATLAB function is part of a group of functions to calculate the coupled vibro-acoustic response using modal coupling theory. This function can be used to plot the mode shape of the acoustic and structural models.
Sec 9.3, p. 579	createloadcase.m This MATLAB function is part of a group of functions to calculate the coupled vibro-acoustic response using modal coupling theory. This function is used to define the structural and acoustic loads that are applied to the system.

Section, Page No.	Filename / Description
Sec 9.3, p. 579	<p><code>coupled_response_fahy.m</code></p> <p>This MATLAB function is part of a group of functions to calculate the coupled vibro-acoustic response using modal coupling theory. This function is used to calculate the vibro-acoustic response and calculates the modal participation factors resulting from the applied structural and acoustic loads. The modal participation factors are used by other functions in this group to calculate results such as acoustic pressure, structural displacement, acoustic potential energy, and structural kinetic energy.</p>
Sec 9.3, p. 579	<p><code>cav_pressure.m</code></p> <p>This MATLAB function is part of a group of functions to calculate the coupled vibro-acoustic response using modal coupling theory. This function uses the modal participation factors calculated using the function <code>coupled_response_fahy.m</code> to calculate the pressure at a node within the acoustic cavity.</p>
Sec 9.3, p. 579	<p><code>str_displacement.m</code></p> <p>This MATLAB function is part of a group of functions to calculate the coupled vibro-acoustic response using modal coupling theory. This function uses the modal participation factors calculated using the function <code>coupled_response_fahy.m</code> to calculate the displacement of a node in the structure.</p>
Sec 9.3, p. 579	<p><code>acousticpotentialenergy.m</code></p> <p>This MATLAB function is part of a group of functions to calculate the coupled vibro-acoustic response using modal coupling theory. This function uses the modal participation factors calculated using the function <code>coupled_response_fahy.m</code> to calculate the acoustic potential energy within the acoustic cavity.</p>
Sec 9.3, p. 579	<p><code>structuralkineticenergy.m</code></p> <p>This MATLAB function is part of a group of functions to calculate the coupled vibro-acoustic response using modal coupling theory. This function uses the modal participation factors calculated using the function <code>coupled_response_fahy.m</code> to calculate the structural kinetic energy of the structure.</p>

Section, Page No.	Filename / Description
Sec 9.5.3, p. 589	TL_panel_roussos.m This MATLAB function is used to calculate the transmission loss of a rectangular panel due to an incident plane wave striking the surface of the panel at an arbitrary angle using the theory presented in Roussos [130].

Appendix D Errors

Sec D.1.2, p. 630	cylinder_plot_scattered_pressure_junger_feit.m This MATLAB code can be used to calculate the scattered sound pressure level from a plane wave striking an infinitely long rigid cylinder, using the theory by Junger and Feit [97, p. 322].
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Appendix E Export of Nodal Area from ANSYS

Sec E.1, p. 648	power_freefield_hemisphere.m This MATLAB function is used to calculate the sound power radiating through a hemi- or spherical surface comprising FLUID130 infinite elements. The coordinates of the nodes and the pressure at the FLUID130 elements are exported from ANSYS and this script imports the results and calculates the radiated sound power.
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