

### **Acoustic Analyses Using Matlab® and Ansys®**

Carl Q. Howard and Benjamin S. Cazzolato  
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Howard and Cazzolato from the University of Adelaide have produced a useful book explaining how to perform acoustic analyses using ANSYS, a commercial finite element software package widely used in academia and industry. The book is comprised of a number of test cases worked out using the newer ANSYS Workbench as well as the older ANSYS Parametric Design Language (APDL). The text takes advantage of the new Acoustics Application Customization Toolkit (ACT) that is essentially a toolbar or shell for ANSYS Workbench making it simpler for acoustic analysis.

Though the title of the book appears to give equal weight to MATLAB and ANSYS, the text is primarily directed towards the ANSYS user. That is to its benefit. Though the authors provide MATLAB scripts to determine theoretical solutions and postprocess data, little additional background is provided on the use of MATLAB and an understanding of MATLAB scripting is assumed.

The book will be especially useful to students who are taking a course in which ANSYS will be used for acoustic simulation. Acoustic sources, boundary conditions and different material models are explained in detail. Over 20 test cases are described including analyses of simple mufflers, lined ducts, reverberation rooms, baffled pistons and sound transmission through a panel.

With the large number of test cases, the book functions as a de facto verification manual for the ANSYS acoustic capabilities. Most test cases include a step-by-step tutorial for solving the problem using the Acoustics ACT in ANSYS Workbench. Accordingly,

the book is ideal for the first time user learning how to use ANSYS for acoustics.

The book covers some fundamentals, but primarily those that are germane to ANSYS. For example, the book discusses basic muffler and silencer considerations, room acoustics theory, different sound absorbing material models and determining panel transmission loss. However, it leaves topics such as A-weighting, 1/3-octave bands, perforate models and determination of insertion loss of mufflers to standard noise and vibration texts. Since the number and range of test cases is fairly comprehensive, much of the theory used by a student in an introductory acoustics course is included. However, I believe it is best if the book is used in conjunction with an applied noise and vibration control text.

Though ANSYS does not have the capabilities of the more specialized acoustics software packages, it is widely used at most universities and is likely more available to students. ANSYS is also widely used in industry and the capabilities in ANSYS are adequate for many industrial users. Moreover, users of the more specialized packages can model the included test cases to gain confidence in their software use. Hence, I think that the book will find a wide audience.

In summary, my students have found the book invaluable for learning how to use ANSYS Workbench for solving vibro-acoustics problems. The examples are numerous, detailed, well chosen and complete with theoretical solutions. For these reasons and others, I believe ANSYS users will keep a copy of the book nearby and refer to it often.

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