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Book review

M.P. Norton, D.G. Karczub (Eds.), *Fundamentals of Noise and Vibration Analysis for Engineers* by Cambridge University Press, Cambridge, UK, 2003, ISBN 0 521 49913 5 (paper back) and 0 521 49561 X (hardback), (pp. xx + 631, price, paperback £45, US\$70, Hardback £130, US\$190).

“Fundamentals of Noise and Vibration Analysis for Engineers” by Norton and Karczub is exactly that: a pedagogic tour-de-force through the theoretical and practical fundamentals of noise and vibration analysis that, refreshingly, is as conversant with the practices of the professional noise control engineer as it is with theoretical elements that underpin his or her work. As an introductory text, its value lies in the authors’ explicit programme, both to address the dichotomy between the paradigms of acoustic and structural analysis and, perhaps more crucially, to elucidate the links and associations between fundamental theory and the practical rigours of applied noise control. This inclusiveness, naturally, leads to a selection of material that is broadly encompassing and didactic, rather than innovative or deeply illuminating. However, with excellent advanced texts available in all the fields covered in the book (all of which are conscientiously referenced by the authors), this is by no means a shortcoming, and one cannot overstate the importance of a text that is willing to give an equally respectful and assiduous treatment of both the theoretical and practical aspects of noise and vibration control.

The book begins, as so many do, with a chapter reviewing the principles of mechanical vibration, which is followed by a more succinct recapitulation of the principles of acoustics in Chapter 2. The presentation here is diligent and pedagogic, and meticulously lays the groundwork for Chapter 3, the theoretical kernel of the work, which is an enumeration of the principles of the interaction of sound waves and structures—specifically radiation from vibrating structures and sound transmission through panels and partitions, with a short but informative overview of the effects of fluid loading. Though largely theoretical in their material, the opening three chapters are clearly informed and motivated by the practical context in which the theory is to be applied. The advantage this confers is exploited in the more practical subject matter of Chapters 4 and 5, which concern, respectively, noise and vibration control and signal analysis, and in which the careful theoretical preparations of the opening chapters are fully employed. Chapter 6, on Statistical Energy Analysis, follows naturally from both the theoretical and practical deliberations of the earlier chapters and apart from providing a coherent coda to the core material of the book, is also a very welcome contribution to the all too scarce introductory literature on SEA.

In Chapter 7, the core material is applied to a case study—noise and vibration in pipes. The authors are clearly on their home turf, and the highly pedagogic, but perhaps slightly ponderous, style that has hitherto characterized the book finally begins to pick up pace; the treatment,

though, is as scrupulous as ever and loses nothing of its lucidity. The topic is a showcase for the utility of the authors' programme, drawing indiscriminately from material on acoustics, structural vibration and the interaction between the two, and enjoying the interplay of motivation and elucidation between theoretical development and its practical application. After all the excitement of the pipe noise case study, we find ourselves firmly back in the classroom for Chapter 8, which gives a characteristically clear and thorough account of the use of noise and vibration monitoring as a diagnosis tool.

The authors' erudition and their admirable willingness and ability to treat theory and practice on an equal footing makes *Fundamentals of Noise and Vibration Analysis for Engineers* a worthy addition to the corpus of noise and vibration texts. The scrupulous and lucid presentation makes it manifestly suitable for students, but the focus on the interdependencies between theoretical disciplines and the clarity with which the authors chart the development of theory all the way to its practical application also make the book eminently well suited to practitioners and specialists requiring a fundamental overview of a new field.

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