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Engineering the Guitar: Theory and Practice by Richard Mark French, Springer, 2009, pp. xii + 266. Scope: monograph. ISBN 978 0 387 74368 4. Level: undergraduate physicists and engineers, musicologists, guitar builders and players.

Why do guitars sound like they do, and how do you set about making one? These are central questions addressed by Richard French in this attractive new book. He is both an assistant professor of engineering and also a guitar builder and player, so that one could hardly imagine anybody better equipped to write a book with this wide coverage.

French writes, in part, with his own undergraduates very much in mind. He describes them as "...mathematically literate, but not always comfortable with calculus", and this specifies quite well the level of the more mathematical chapters: calculus is used sparingly, and only when necessary. But many chapters are of a practical or descriptive character and involve no mathematics at all. To set the context, French opens the book with a short history of the guitar, both classical and electric. I found this very interesting in all sorts of ways. For example, I had not appreciated the instrument's dramatically differing social contexts in the USA, where it carried connotations of slavery and cowboys, and in Europe where it was adopted early on by serious musicians.

So that the book can be read by musical non-experts, and to provide essential support for the later discussions of design, French then provides a substantial chapter on acoustics and musical theory. It covers the basics of music, scales and temperament, ways of quantifying sound, how sound radiates from a guitar, human perceptions of sound, Fourier methods, and graphical representations of sound in both the time and frequency domains. This chapter effectively prepares the reader for the rest of the book, and can be read selectively to fill any holes in his or her knowledge. It is a valuable, indeed essential, provision given the diverse readership that is anticipated.

Thus prepared, the reader can move on to discussions of the structure of the guitar in several different variants, how static and dynamic loads are calculated, how the properties of real (non-ideal) strings combine with body vibrations to produce the sound, analytical models of the vibrations, how to calculate fret spacings, constructional and manufacturing methods, discussions of the factors that determine sound quality, and the choice and mode of operation of electronics for electric guitars.

The book is well-written, and generously illustrated with interesting black-and-white images and graphs. It is unavoidably interdisciplinary involving physics, engineering, mathematics, history and musicology, as well as practical aspects like how to optimise the choices of woods, glues and varnishes. There is an extensive list of references to more specialst works on particular topics, and a good index. I have slight quibbles with the ordering of some of the material, and with the use of one or two technical terms. For example I looked in vain for a definition of the "nut", a term that will doubtless be completely obvious to practicioners, but which may not be to others. It was seemingly neither explained nor illustrated in any of the diagrams of guitar parts. But this is a trivial point, and a clear exception to the huge number of other technical terms that are very carefully glossed. *Engineering the Guitar* is a unique and special addition to the literature, and it deserves to be widely read. For anyone contemplating construction of a guitar it will surely be indispensible. Physicists and engineers with musical inclinations, as well as guitar players and many others, are likely to be fascinated.

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