



# Wave Propagation in Structures: An FFT-Based Spectral Analysis Methodology

By James F. Doyle



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The study of wave propagation seems very remote to many engineers, even to those who are involved in structural dynamics. I think one of the reasons for this is that the examples usually taught in school were either so simple as to be inapplicable to real world problems, or so mathematically abstruse as to be intractable. This book contains an approach, spectral analysis, that I have found to be very effective in analyzing waves. What has struck me most about this approach is how I can use the same analytic framework to do predictions as well as to manipulate experimental data. As an experimentalist, I had found it very frustrating having my analytical tools incompatible with my experiments. For example, it is experimentally impos sible to generate a step-function wave and yet that is the type of analytical solution available. Spectral analysis is very encompassing - it touches on analysis, numerical meth ods, and experimental methods. I wanted this book to do justice to its versatility, so many subjects are introduced. As a result some areas may seem a little thin and I regret this. But I do hope, nonetheless, that the bigger picture, the unity, comes across. To encourage you to try the spectral analysis approach I have included complete source code listings to some of the computer programs mentioned in the text.

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