THEORETICAL ACOUSTICS OF UNDERWATER STRUCTURES

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PREFACE

The mathematics of sound radiation from, and sound scattering by, elastic structures has received much attention in the latter half of this century due to its relevance to the problem of detecting and classifying submarines and other submersibles. The theoretical work described herein is substantially a compilation of our research interests for the Navy on the acoustics of basic elastic structures excited by mechanical forces and acoustic sources. It is not intended as a comprehensive treatment of the subject for which even a list of textbooks and research publications is far too lengthy to record here. The standard reference work on theoretical structural acoustics is the textbook "Sound, Structures, and Their Interaction", published by the MIT Press, and authored by Junger & Feit. The Journal of Sound and Vibration and the Journal of the Acoustical Society of America are the main repositories of refereed papers.

While the textbook has been written primarily as a reference work at a postgraduate level, experience has shown that undergraduates are well able to cope with most aspects provided they are supervised accordingly. The theoretical methods, developed originally for Naval noise control problems, should also find civil application in the acoustic modelling of novel structures fabricated from both fibre reinforced and isotropic materials, such effort being increasingly desirable and necessary in this noisy world. The textbook should be a useful source of information for those scientists who need to develop skills in theoretical and/or numerical modelling in dynamics and acoustics, and it is hoped that it will also be a profitable source of material for scientists whose research interests lie elsewhere in continuum mechanics.

The first edition of any sizeable mathematical publication is likely to contain algebraic and typographical errors. The responsibility for those here is ours alone. When formulae are extracted from published literature it is generally advisable to check them against originals and also, if possible, to re-work the mathematics.

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