

PREFACE

This book is designed as an introduction for the research worker starting in the important and wide-ranging field of cavitation. I hope that it will be useful also as a reference book and to that end I have included references to papers and general references to proceedings of conferences and books on cavitation. The literature is enormous, and I have tried to give sufficient references to lead the reader to most other references on cavitation.

Cavitation is such a large subject that I have had to rely on the work of specialists, except for the two fields in which I have worked, sonoluminescence and cavitation in a liquid between rotating rollers. As the original expositions in the other fields cannot be improved upon I have used them closely and I hope that I have acknowledged the authors' work by name. If I have omitted to do this anywhere, I offer my unqualified apology.

There is a need for a new book on general cavitation, since existing books on hydrodynamic cavitation require updating and extending, and there is no book at all on acoustic cavitation. The author has had the rare opportunity of working in both acoustic and hydrodynamic cavitation. I hope that workers in acoustic cavitation will find something of interest in the chapter on hydrodynamic cavitation and that workers in hydrodynamic cavitation will likewise find some aspects of the chapter on acoustic cavitation illuminating.

The plan of the book as outlined in the table of contents needs a few observations. In Chapter 1 the reader is advised to be cautious about the *definitions* for, as Professor E.N. da C. Andrade has remarked, 'A definition is something you need if you do not know what you are talking about. If you do know what you are talking about you do not need a definition!' Chapter 2 on *bubble dynamics* deals mainly with bubble behaviour fundamentals when the bubble is *not* under the influence of an *acoustic or hydrodynamic field* whereas Chapters 3 and 4 deal with bubbles when they *are* under the influence of these fields. Chapter 5 is on *sonoluminescence*. Chapter 6 is on *sonochemistry*, which is rapidly developing into a large subject area. Chapter 7 on *bubble spectrum analysers* is an up-to-date review of the fundamental measurement of the number of bubbles of each size that exist in a given sample. Finally, in Chapter 8, I have described as many instances, uses and nuisances of cavitation in physics, chemistry, biology, medicine, industry and everyday life as I could find. I would welcome news of any others not mentioned here.

I have often been asked how I became interested in cavitation. Like a lot of good things it happened quite by accident. I was at an Open Day at Imperial College when I read a poster by Peter Jarman describing his work on *sonoluminescence* (Chapter 5, reference 9). This phenomenon not only

presented the challenge of an intriguing puzzle but also seemed to be just the subject for a lone researcher with few resources. And so it started, through PhD and supervisory work, visits at home and abroad to conferences and laboratories, during which time I made many friends, leading eventually (but I hope not finally!) to the production of this book.

The writing has been done over a period of twenty years, sometimes in unlikely places such as hospitals, hotels and mountain huts. During this time I have incurred the debt of a large number of people. I should, therefore, like to thank Dr R.W.B. Stephens who made it all possible; the two Principals of Watford College, Dr T.J. Howard and the late Dr D.O. Bishop, who gave me constant support and encouragement; Professor Wesley Nyborg, who read the draft manuscript, wrote the Foreword and gave much valuable advice; Dr Peter Lush, Dr Pat Vaughan, Dr Sidney Leeman, Dr Tim Mason and the late Dr E.A. Neppiras, who critically read some of the chapters and suggested many improvements; Mr Joe Graham and Mrs Janet Murphy in the library of Watford College; Mrs Jean Harris, who typed the manuscript with great expertise; and the many scientists all over the world who kindly sent me offprints, reports and photographs. Finally, I would like to express my gratitude to Mark Corbett and Penny Walker at McGraw-Hill.

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