Wind Loading of Structures

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John D. Holmes

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Preface

The wind loading of structures has had significant research effort in many countries during the last 30 to 35 years. Several thousand research papers have been published in journals and conference proceedings in all aspects of the subject. In many countries, wind loading governs the design of many structures, yet even there a good knowledge and understanding of wind loading amongst practising engineers is not widespread, despite the wealth of material available. Why is this the case? There are probably several reasons. The multi-disciplinary nature of the subject – involving probability and statistics, meteorology, the fluid mechanics of bluff bodies, and structural dynamics, undoubtedly is a deterrent to structural engineers whose expertise is in the analysis and design of structures under nominally static loads. The subject is usually not taught in University and College courses, except as final year undergraduate electives, or at post-graduate level, although exposure to wind loading codes of practice or standards often occurs in design courses. Like many subjects, the jargon used by specialists and researchers in wind loading can be a deterrent to many non-specialists.

This book has been written with the practising structural engineer in mind, based on many years of experience working with clients in this profession. I hope it may also find use in advanced University courses. Although there are several other books on the subject, in this one I have attempted to fill gaps in a number of areas:

- An overview of wind loading on structures of all types is given (not just buildings).
- The method of effective static wind load distributions is covered in some detail (mainly in Chapter 5). I have found this approach to fluctuating and dynamic wind loading to have good acceptance amongst structural engineers, raised on a diet of static load analysis.
- Internal pressures are discussed in some detail (Chapter 6).
- An attempt has been made (Appendix D) to give an overview of extreme and design wind speeds for the whole world. This is probably a first anywhere, but it is an important step, and one that needs to be expanded in the future, as design projects are now routinely carried out by structural engineers in countries other than their own. The need for such information will become more important in the future as the expansion in world trade (including engineering services) continues.

I have tried to minimise the amount of mathematics, and concentrate on the physical principles involved. In some chapters (e.g. Chapter 5), I have found it necessary to include a significant amount of mathematics, but, hopefully, not at the expense of the physical principles. These sections could be omitted in a first reading.

I have been influenced by the work of many outstanding researchers and colleagues in this field over a period of thirty years. They are too many to list but most of their names

will be found in the reference lists attached to each chapter. However, a number of people have assisted with the production of this book: Professor K. C. S. Kwok for contributing most of Section 15.9; Dr. John Ginger, Michael Syme, Dr. Ignatius Calderone and Dr. Jannette Frandsen for reading parts of the manuscript; Heather Fordham, Paul Bowditch, Maryjeanne Watt and Harry Fricke for the drafting of figures, Shob Narayan for typing permission letters, and Elizabeth Gray for assisting with indexing. I am most grateful for their assistance. I would also like to thank the staff of E. F. and N. Spon for their patience in waiting for delivery of the manuscript.

I would be most happy to receive constructive comments and suggestions from readers.

J. D. Holmes
Mentone, Australia
JDHConsulting@Bigpond.com