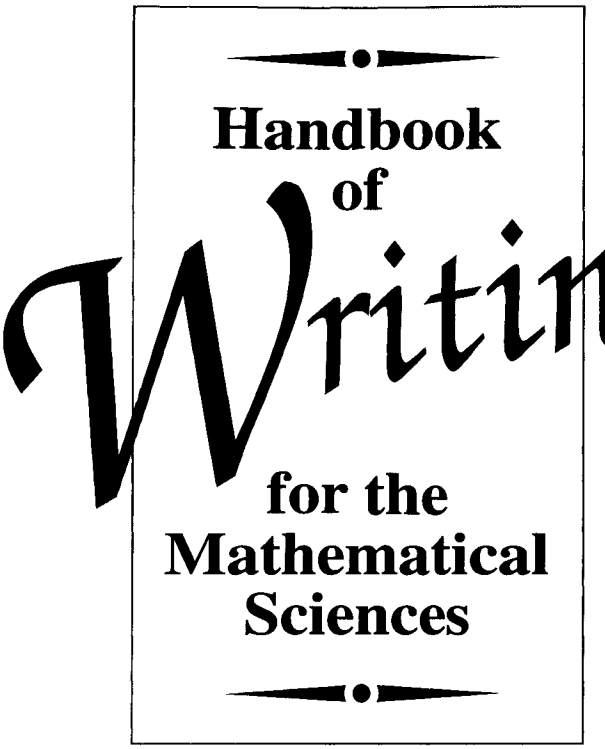

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Second Edition

Handbook of Writing for the Mathematical Sciences

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Preface to the Second Edition

In the five years since the first edition of this book was published I have received numerous email messages and letters from readers commenting on the book and suggesting how it could be improved. I have also built up a large file of ideas based on my own experiences in reading, writing, and editing and in examining and supervising theses. With the aid of all this information I have completely revised the book. The most obvious changes in this second edition are the new chapters.

- *Writing and Defending a Thesis.* Since many of the readers of the book are graduate students, advice on how to write a thesis and how to handle the thesis defence was a natural addition.
- *Giving a Talk.* The revised chapter "Writing a Talk" from the first edition gives advice on preparing slides for a talk. The new chapter explains how to deliver a talk in front of an audience.
- *Preparing a Poster.* The poster is growing in popularity as a medium of communication at conferences and elsewhere, yet many of us have little experience of preparing posters.
- *TEX and LATEX.* Since the first edition of this book was published, LaTeX 2$_\varepsilon$ has become the official version of LaTeX, thereby solving many of the problems involving, for example, incompatible dialects of LaTeX, font handling, and inclusion of PostScript figures in a LaTeX document. I have moved the discussion of TeX, LaTeX, and their associated tools to a new chapter. Many more tips on the use of TeX and LaTeX for typesetting mathematics are now given, and the discussions of BibTeX and indexing have been expanded. The many mathematical symbols in the AMS fonts have been added to Appendix B ("Summary of TeX and LaTeX Symbols").

Among the new material in existing chapters, the section "How to Referee" in the chapter "Publishing a Paper" offers advice on this important aspect of the publication process, and in the chapter "Writing a Paper" suggested formats are given for referencing items on the World Wide Web.

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The renamed chapter "Aids and Resources for Writing and Research" contains a new section "Library Classification Schemes", which should help readers to find their way around libraries. The material on the Internet in this chapter has been completely rewritten in the light of the World Wide Web (which was not mentioned in the first edition). I have minimized the number of URLs (Web addresses) given, for two reasons. First, URLs can and do change over time. Second, if you want to know more about almost any subject mentioned in the book, just choose appropriate key words (e.g., "mathematical writing", "Roget's Thesaurus", or "Society of Indexers") and invoke your favourite search engine from your Web browser. There is a good chance that you will find the information, or particular Web pages, that you are looking for.

The subject of mathematical writing can easily become dull and boring, so to liven it up I like to include anecdotes, unusual paper titles, humorous quotations, and so on. The new edition contains many more of these.

Separate author and subject indexes are now provided. The author index removes some clutter from the subject index, and you can use it to find where references in the bibliography are discussed.

The bibliography has been updated. Many new editions of books are referenced and over 70 new references have been added.

A Web page has been created for the book, at

`http://www.siam.org/books/ot63/`

It includes

- Updates relating to material in the book.
- Links to references in the bibliography that are available on the Web.
- Links to other Web pages related to mathematical writing, LaTeX, BibTeX, etc.
- Links to Web pages giving examples of posters.
- The bibliography for the book in BibTeX form, which is also available from Bibnet as `han-wri-mat-sci.bib`.

Several people helped with the second edition by reading and commenting on drafts:

David Abrahams, Henri Casanova, Bobby Cheng, Tony Cox, Des Higham, Doris Higham, Nil Mackey, Alicia Roca, Françoise Tisseur, Nick Trefethen, Joan Walsh, Barry White.

Working with the SIAM staff was once again a pleasure. I thank, in particular, my copy editor Beth Gallagher, Vickie Kearn and Mary Rose Muccie.

This book was typeset in LaTeX using the `book` document style and various LaTeX packages. The references were prepared in BibTeX and the index with MakeIndex. I used software from the emTeX distribution, running on a Pentium workstation. I used text editors The Semware Editor (Semware Corporation) and GNU Emacs (Free Software Foundation) and checked spelling with PC-Write (Quicksoft).

Manchester
January 1998

Nicholas J. Higham

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Preface to the First Edition

In this book I aim to describe most of what a scientist needs to know about mathematical writing. Although the emphasis is strongly on *mathematical* writing, many of the points and issues I discuss are relevant to *scientific* writing in general. My main target audience is graduate students. They often have little experience or knowledge of technical writing and are daunted by the task of writing a report or thesis. The advice given here reflects what I have learned in the ten years since I wrote my first research report as a graduate student and describes what I would have liked to know as I started to write that first report. I hope that as well as being a valuable resource for graduate students, this book will also be of use to practising scientists.

The book has grown out of notes for a short lecture course on mathematical writing that I gave at the University of Manchester in May 1992. As I prepared the course I realized that, although several excellent articles and books on mathematical writing are available (notably those by Halmos (1970) [121], Gillman (1987) [104] and Knuth, Larrabee and Roberts (1989) [164]), none functions as a comprehensive handbook that can be both read sequentially and used as a reference when questions about mathematical writing arise. I have attempted to provide such a handbook. (I hope that the comment of one journal referee, "This paper fills a much needed gap in the literature", is not applicable to this book!)

As well as covering standard topics such as English usage, the anatomy of a research paper, and revising a draft, I examine in detail four topics that are usually discussed only briefly, if at all, in books on technical writing.

- The whole publication process, from submission of a manuscript to its appearance as a paper in a journal.
- Writing when English is a foreign language.
- How to write slides for a talk.
- The use of computers in writing and research. In particular, I discuss modern practices such as computerized typesetting in TEX, the use of computer tools for indexing and checking spelling and style, and electronic mail and ftp (file transfer protocol).

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An important feature of the book is that many examples are given to illustrate the ideas and principles discussed. In particular, Chapter 7 contains a collection of extracts from the mathematics and computer science literature, with detailed comments on how each extract can be improved.

In writing the book I have been helped and influenced by many people. Several people read the entire manuscript at one or more of its various stages, offered constructive suggestions, encouragement and advice, and made sure I said what I meant and meant what I said. They are

> Ian Gladwell, Des Higham, Doris Higham, Nil Mackey, Fred Schneider, Pete (G. W.) Stewart and Nick Trefethen.

Other people who have read portions of the book and have given help, suggestions or advice are

> Carl de Boor, David Carlisle, Valérie Frayssé, Paul Halmos, Bo Kågström, Philip Knight, Sven Leyffer, Steve Mackey, Volker Mehrmann, June O'Brien, Pythagoras Papadimitriou, Beresford Parlett, Nigel Ray, Stephan Rudolfer, Bob Sandling, Zdenek Strakos, Gil Strang, Charlie Van Loan, Rossana Vermiglio, Joan Walsh, Barry White, and Yuanjing Xu.

I thank all these people, together with many others who have answered my questions and made suggestions. In researching the contents of the book I was inspired by many of the references listed in the bibliography, and learned a lot from them. I acknowledge the Nuffield Foundation for the support of a Nuffield Science Research Fellowship, during the tenure of which I wrote much of the book. Last, but not least, I thank the SIAM staff for their help and advice in the production of the book—in particular, Susan Ciambrano, Beth Gallagher and Tricia Manning. I would be happy to receive comments, notification of errors, and suggestions for improvement, which I will collect for inclusion in a possible second edition.

This book was typeset in LaTeX using the `book` document style with G. W. Stewart's `jeep` style option. I prepared the references with BibTeX and the index with MakeIndex. I used text editors Qedit (Semware) and GNU Emacs (Free Software Foundation), and checked spelling with PC-Write (Quicksoft).

Manchester
December 1992

Nicholas J. Higham