

Handbook of Writing for the Mathematical Sciences

by Nicholas J. Higham

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Although several excellent articles and books on mathematical writing are available, no one makes a reference when questions about mathematical writing arise. By the present book, Nicholas J. Higham, author of more than 40 publications and editor of the SIAM Journal on Matrix Analysis and Applications, provides such a reference handbook. The emphasis is placed on mathematical writing, but many of the discussed points and issues are relevant to scientific writing in general. The author's notes prepared for a short lecture course on mathematical writing, held at the University of Manchester in May 1992, matured into a book. Four topics are examined in detail:

- Editing process, from submission of a manuscript to its publication, as a paper in a journal.
- Writing when English is a foreign language.
- How to write English for a talk.
- Use of computers in writing and research; such modern practices as computerized typesetting in $\text{T}_\text{E}\text{X}$, the use of computer tools for indexing and checking spelling and style, electronic mail and file transfer protocol (ftp), are discussed.

The book is singular in that it enlivens the ideas and principles discussed, by giving examples.

The book includes 10 chapters, 5 Appendices, glossary, an extensive bibliography, index, and was typeset using $\text{L}_\text{A}_\text{T}_\text{E}_\text{X}$ facilities.

Chapter 1 points out the general principles used in writing and states that writing is not simply a task to be executed once research or other preparation is completed - it can be an integral part of the work process. Writing is a difficult task and a good writing reflects a clear thinking. Best ways, in the author's opinion, of improving a writing is to accept a constructive criticism, and learn from it, and to read the writing as much as possible with a

critical eye. Some recommendations of very good mathematical books, by excellent writers, are made perusal.

Writer's tools and recommended reading are **Chapter 2** focus. The most valuable tool for a writer is a dictionary, used to check spelling, shades of meaning, and usage. Oxford English Dictionary, Webster's Third New International Dictionary, its major competitor, and other important dictionaries from Britain and the United States are the author's undisputable guides. Also, a thesaurus, a guide to English usage, a guide to book production, style and printing may be of great help in writing. Concerning the mathematical writing, several guides are available, and some journals (e.g. IEEE Transactions on Professional Communication) publish papers on many aspects of technical communication. Books summarizing the experience of various authors in writing mathematics, physics and chemistry are indicated as of general interest to scientists.

Mathematical writing, may it be in general aspects, such as the choice of notation, or in particular aspects, such as how to punctuate mathematical expressions, is the core of **Chapter 3**. Differences between theorems, lemmas and propositions, proofs, the role of examples, definitions, displaying equations, parallelism at many levels, are pointed out.

English usage is particularly important for mathematical writing as shown in **Chapter 4**. Starting from several usage guides, partially mentioned in Chapter 2, an overview of how mastering English makes writing more significant, is taken. If looked at separately, some remarks could sound superfluous, but if taken as a set, they would count a lot in good writing. Different such aspects as: abbreviations, absolute words, active versus passive, adjective and adverb abuse, compound words, distinctions, elegant variation,

linking words, simplification, synonym selection, word order, etc., are all of some consequence.

As Chapter 5 shows, it makes twice difficult to write mathematics if you are a non-native speaker of English, and the author's merit is that of giving pieces of advice on how English matches this subject-matter.

Since the general rules presentation of the previous chapters will suffice, Chapter 6 insists on how to write a paper, a thesis, a book or a review. Readership and its relation with a writing and also the building blocks from title to reference list, are highlighted.

After all previous explanations, Chapter 7 is dedicated to revising a draft. Excerpts from the mathematics and computer science literature come to exemplify.

A new concrete step is taken in Chapter 8, where intricacies of publication are to be deciphered to novices, showing them when to decide on submitting a manuscript and, eventually, how to assume proof reading. It especially addresses those who contribute to refereed journals and conference proceedings.

Writing of a mathematical talk, as a formal presentation prepared in advance for a departmental seminar or for a conference, is discussed in Chapter 9. Attention is entirely paid to slides, which most speakers at conferences would prefer as their intercourse medium. All the steps in writing of a talk: designing the talk, writing the slides, improving the slides, presenting the talk, are discussed in detail.

Chapter 10 is dedicated to computer aids for writing and research. After an introduction to technical word processing, the author presents the T_EX package, L_AT_EX and AMS-T_EX, as macro packages that "sit on top" of T_EX, the BIBT_EX, as a valuable aid to preparing reference lists with L_AT_EX, MakeIndex, a C program that makes an index for a L_AT_EX document. Also, different powerful editors, like Emacs and its versions, programs for checking and possibly correcting spelling errors, checking the style, are presented.

The same chapter describes some of computer facilities available over the Internet network, of general interest for mathematicians. The author presents the newsgroups and various magazines available by electronic mail, the electronic repository of public domain mathematical software for scientific computing community (Netlib), e-MATH computer service with its features and the file transfer protocol (ftp) for interactively transferring files between different computers, particularly Unix machines, on the Internet network. An example of an anonymous ftp session is included.

The book appendices contain the Greek alphabet, a summary of T_EX and L_AT_EX symbols, a list of 60 most useful GNU Emacs commands, information on mathematical organizations, and a list of prize-winning expository papers.

An informative glossary, a comprehensive index and the extensive bibliography of the book turn to be valuable tools for the reader.

A lot of facts are brought in for convincing that a successful writing will ever be the mould of many factors, which the author pays attention to. The book is an excellent instrument, of great utility in good writing in mathematical sciences, and not only. Thus, the book is attractive to everyone interested in good writing, from undergraduates to professionals.

In the reviewer's opinion, the book is clearly written and easy to understand, with a readable style and handy format. Reading the book carefully, together with the included examples, is recommended.

This book has certainly set out a new standard in mathematical writing. No other book is available that examines in detail the questions about mathematical writing, and functions as a comprehensive handbook. At the same time, it is an interesting addition to the existing valuable articles and books on mathematical writing.

Theodor-Dan Popescu