Using SIAM's GH Book Class

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July, 2013

Contents

1 Introduction

This file is documentation for the SIAM LaTeX book macros. It provides instruction for submission of your files.

To ensure quality typesetting according to SIAM style standards, SIAM provides a LaTeX macro style (class) file. Using LaTeX to format a manuscript should simplify the editorial process and lessen the author's proofreading burden. However, it is still necessary that the author proofread the galley proofs with care.

Final electronic files for your book will be requested by your Acquisitions editor, who will give you instructions on the best way to submit these files. When submitting your files, please be sure to include any additional macros and packages (other than those provided by SIAM) or special instructions that will be needed to generate the book.

SIAM uses Windows-based computers for LaTeX processing. Therefore all filenames should be restricted to alphanumeric characters, including hyphens and underscores, plus a three-character extension. **All figure files must be submitted in EPS format.** PDF art files cannot be accepted for figures because this requires running pdflatex to produce typeset output; this bypasses the Adobe PDF job options that commercial printers need to render figures properly in the printed book. All color figures must use the CMYK color model, as required by the printer.

After the manuscript is copyedited and the files are corrected, SIAM will mail the revised proofs to you so you can read them against the original edited hardcopy manuscript. Author proofreading is an important but easily overlooked step. Even if SIAM were not to introduce a single editorial change into your manuscript, there would still be a need to check the proofs because electronic transmission can introduce errors.

The distribution contains the following items: `newsiambook.cls`, the main macro package based on `book.cls`; `subeqn.sty`, a package for equation numbering (see Section 4.3.3 for an explanation); `crop.sty` for placing trim marks on the page; and various art pieces used to produce the chapter openers and part openers (see Section 2). Also included are this file, `documentation2013.tex`, and a sample file, `booksample2013.tex`. The sample file represents a standard application of the macros.

SIAM uses Helvetica for section and running heads and Garamond for text and math. These fonts are available through the CTAN package `mathdesign.sty`. SIAM now uses `backref.sty` to add page numbers to the Bibliography entries.

The rest of this paper highlights some keys to effective macro use, points out options and special cases, and describes SIAM style standards to which authors should conform.

2 The Document Preamble and Class Options

If your LaTeX installation includes only the basic Computer Modern font set, use the following entries in your preamble:

```
\documentclass[optional arguments]{SIAM-GH-book}

\usepackage{epsfig}
\usepackage{graphicx}
\usepackage{makeidx}
\usepackage{multicol}

\usepackage{crop}
\crop
\makeindex
```

If you are using a modern LaTeX installation (such as MikTeX or TeXLive), a generic preamble would look like this, and will provide the Garamond and Helvetica fonts:

```
\documentclass[optional arguments]{SIAM-GH-book}
\usepackage{epsfig}
\usepackage{graphicx}
\usepackage{makeidx}
\usepackage{multicol}

\usepackage{crop}
\crop
\makeindex

\usepackage[pageref]{backref}
\renewcommand*{\backrefalt}[4]{%
\ifcase #1 %
(Not cited)%
\or
(Cited on p.~#2)%
\else
(Cited on pp.~#2)%
\fi
}
\renewcommand*{\backreftwosep}{, }
\renewcommand*{\backreflastsep}{, }

\usepackage[urw-garamond,sfscaled=false]{mathdesign}%%%%%after amsmath & amsfonts
\usepackage[T1]{fontenc}
\renewcommand{\sfdefault}{phv}
\renewcommand{\ttdefault}{pcr}
```

See the Addendum for setup hints for MikTEX users.

Other class options can be included in the bracketed argument of the command, separated by commas. Optional arguments include the following:

opener-a, opener-b, opener-c, opener-d Provides for different formatting of the chapter openers and part openers. If no option is used, text-only openers are created.

final Without this option, lines that extend past the margin will have black boxes next to them to help authors identify lines that they need to fix by rewriting or inserting breaks. `final` turns these boxes off so that very small margin breaks that are not noticeable will not cause boxes to be generated.

onethmnum Using `onethmnum` numbers all theorem-like environments consecutively throughout a book with a single digit.

mytheorems Theorem-like environments (theorem, corollary, definition, lemma, proposition) normally number together; that is, they all use the same counter. The `mytheorems` option allows the user to define these structures in the preamble of the document, using independent counters, if desired.

3 Frontmatter

Consisting of the table of contents; lists of figures, tables, notations and algorithms; and the preface, the frontmatter generally has roman page numbers, using the command

```
\frontmatter
```

which follows the standard `\begin{document}` line.

Note
You need not create your entire book as a single file. Use the standard LATEX commands `\include` and `\includeonly` to work with multiple files. See Lamport for details on usage.

3.1 Table of Contents

Use the `\tableofcontents` command to automatically create the table of contents.

3.2 Preface

Use the `\begin{thepreface}...\end{thepreface}` commands to create your preface.

3.3 Optional Frontmatter Items

Various lists can be generated by simply including their respective commands in the frontmatter of your manuscript:

```
\listoffigures
\listoftables
\listofalgorithms
```

Formatting is automatic.

Additionally, you can enter a list of contributors as in the following example:

```
\begin{contributors}
\contributor{A. Einstein}{Institute for Advanced Studies\\
Princeton University}

\contributor{Enrico Fermi}{University of Chicago}

\contributor{John von Neumann}{Institute for Advanced Studies\\
Princeton University}
\end{contributors}
```

The entries are automatically formatted. Note that any number of lines may be included in either argument; terminate lines with the double backslash (\\).

4 The Body

4.1 Part Pages

Insert the command

```
\mainmatter
```

after your frontmatter. This will change page numbering to arabic, as well as reactivating chapter numbering.

If your book is divided into parts, use the standard `\part` command:

```
\part{A Sample Part Page}
```

4.2 Chapters

The syntax of the `\chapter` command follows that of the standard LaTeX:

```
\chapter[optional text]{Chapter title}
```

in which `optional text` can be a shortened version of the chapter title, for inclusion in the running head.

Recall that the chapter and part openers are formatted according to the optional argument in the `\documentclass` line.

You may insert a quote following the chapter head,

```
\begin{chapterquote}[optional length]
We have nothing to fear but fear itself.\\
---{\upshape Franklin D. Roosevelt}\\[6pt]
I am not a crook.\\
---{\upshape Richard M. Nixon}
\end{chapterquote}
```

where `optional length` will move the entire quote block.

4.3 Standard LaTeX Commands and Extensions

At this point, all the standard LaTeX commands may be employed, including

```
\section
\subsection
\subsubsection
\begin{table}...\end{table}
\begin{figure}...\end{figure}
\begin{equation}...\end{equation}
```

and, of course, all math operations and constructs. Consult Lamport or Kopka for details.

4.3.1 Lists

Although the standard LaTeX list environments remain intact, several new list structures are available that provide cleaner formatting.

remunerate Similar to the standard `enumerate`, providing indented entries with arabic numerals. Use thusly:

```
\begin{remunerate}
\item Use Gauss quadrature on each interval.
\item Convert the integral to a linear combination of
      integrals of products of B-splines and provide a recurrence
      for integrating the product of a pair of B-splines.
\item Convert the sums of B-splines to piecewise
      B\'{e}zier format and integrate segment
      by segment using the properties of the Bernstein polynomials.
\item Express the product of a pair of B-splines as a linear
      combination of B-splines.
      Use this to reformulate the integrand as a linear combination
      of B-splines, and integrate term by term.
\item Integrate by parts.
\end{remunerate}
```

bulletlist Similar to the `itemize` environment. Creates indented entries with a bullet centered vertically on the first line of text.

```
\begin{bulletlist}
\item Use Gauss quadrature on each interval.
\item Convert the integral to a linear combination of
      integrals of products of B-splines and provide a recurrence
      for integrating the product of a pair of B-splines.
\item Convert the sums of B-splines to piecewise
      B\'{e}zier format and integrate segment
      by segment using the properties of the Bernstein polynomials.
\item Express the product of a pair of B-splines as a linear
      combination of B-splines.
      Use this to reformulate the integrand as a linear combination
      of B-splines, and integrate term by term.
\item Integrate by parts.
\end{bulletlist}
```

romannum Similar to `remunerate`, providing indented entries with roman numerals.

```
\begin{romannum}
\item Use Gauss quadrature on each interval.
\item Convert the integral to a linear combination of
      integrals of products of B-splines and provide a recurrence
      for integrating the product of a pair of B-splines.
\item Convert the sums of B-splines to piecewise
      B\'{e}zier format and integrate segment
      by segment using the properties of the Bernstein polynomials.
\item Express the product of a pair of B-splines as a linear
      combination of B-splines.
      Use this to reformulate the integrand as a linear combination
      of B-splines, and integrate term by term.
\item Integrate by parts.
\end{romannum}
```

4.3.2 Theorem-like Environments

The following environments are provided to create various theorem-like structures:

```
\begin{theorem}
.
.
.
\end{theorem}
```

```
\begin{lemma}
.
.
.
\end{lemma}

\begin{corollary}
.
.
.
\end{corollary}

\begin{proposition}
.
.
.
\end{proposition}

\begin{definition}
.
.
.
\end{definition}
```

Two additional environments are also provided:

```
\begin{algorithm}
.
.
.
\end{algorithm}

\begin{proof}
.
.
.
\end{proof}
```

The `algorithm` environment has automatic numbering and an optional title. When one of these environments immediately follows another, use the command

```
\unskip
```

between them to avoid doubling of line spaces.

4.3.3 Subequations

Sometimes it is desirable to designate subequations of a larger equation number. The subequations are designated with (roman font) letters appended after the

number. SIAM has supplemented its macros with the `subeqn.sty`, which defines the environment `{subequations}`.

```
\begin{subequations}\label{EKx}
\begin{equation}
 y_k =  B  y_{k-1} +  f, \qquad k=1,2,3,\ldots
\end{equation}
for  any initial vector $ y_0$.   Then
\begin{equation}
 y_k\rightarrow  u \mbox{\quad iff\quad} \rho( B)<1.
\end{equation}
\end{subequations}
```

All equations within the `{subequations}` environment will keep the same overall number, but the letter designation will increase.

4.3.4 Exercises

The `exercises` environment creates the Exercises heading and an automatically numbered list. Enter each new exercise using the standard `\item` command.

```
\begin{exercises}
\item The first problem. Solve for $x$:
\[
y=\sqrt{x + \displaystyle\frac{1}{2}}
\]

\item The second problem. The second problem. The second problem.
The second problem. The second problem. The second problem. The
second problem. The second problem. The second problem. The second
problem. The second problem.
\end{exercises}
```

4.4 Bibliography

Here we use the standard LaTeX commands:

```
\backmatter
\begin{thebibliography}
.
.
.
\end{thebibliography}
```

The `\backmatter` command turns off chapter numbering for your Index and Bibliography. See Lamport or Kopka for details on creating the bibliography manually or with the freeware BibTeX program.

SIAM recommends the `backref` package, which add the page numbers of each bibliographic reference at the end of each item in the bibliography.

4.5 Indexing

The preamble statements

```
\usepackage{makeidx}
\makeindex
```

prepare your document for indexing. Use the standard LaTeX command

```
\index{entry!subentry}
```

to insert an entry.

After inserting all indexing entries, run the public domain `MakeIndex` program. This utility will order and format your entries and subentries. Again, see Lamport or Kopka for details.

5 Further Reading

Goosens M., Mittlebach F. and Samarin A. (1994). *The LaTeX Companion.* Addison-Wesley, Reading, MA.

Kopka H. and Daly P.W. (1999). *A Guide to LaTeX: Document Preparation for Beginners and Advanced Users, 3rd Ed.* Addison-Wesley, Reading, MA.

Lamport L. (1994). *LaTeX—A Document Preparation System, 2nd Ed. Updated for LaTeX 2ε.* Addison-Wesley, Reading, MA.

6 Addendum: Contributed Volumes

It is desirable to include author names in the chapter openers of books with contributed chapters; the names(s) might also appear in the table of contents.

To insert author name(s), add the following commands following the `\chapter` command:

```
\authortoc{H.G.~Wells, S.L.~Clemens, H.~Melville}

\begin{authorline}
H.G.~Wells\thanks{Mr.~Wells.}, S.L.~Clemens\thanks{Mark Twain.},
and H.~Melville\thanks{Call me Ishmael.}
\end{authorline}
```

See the file `contributedsamp.tex`.

7 Addendum: Installing `mathdesign.sty` and Fonts

We highly recommend MikTeX as our LaTeX engine. Ease of installation, automatic installation of packages, constant upgrades... a winner.

Depending on the recency of your MikTeX installation (version 2.9+), adding the fonts and packages to render the SIAM GH Book design can be as easy as:

1. Downloading the pfb files from

   `http://www.ctan.org/tex-archive/fonts/urw/garamond/`

2. Placing the pfbs into your local (personal) TEX directory (see the MikTEX documentation.

3. Running your document. MikTEX will do the rest, downloading packages as needed.

Alert: You may experience a font-related bug regarding the Helvetica fonts. If running `booksample2013.tex` fails to produce bold headings, place the file `t1phv.fd` (included with our new book class) into your book's working directory.

8 Addendum: Art Submissions

The most important criteria regarding your art:

1. Submit EPS files

2. Set the color model to CMYK

3. Use legible line weights

Every art file in every SIAM publication is routinely checked with Adobe Illustrator and Photoshop. We have identified three main areas in which your art might need correction or revision.

8.1 Color: CMYK and RGB

Printed books require the CMYK color model. RGB figures will be converted on-the-fly into CMYK by the software used at commercial printers. Consider this comparison (best seen on-screen).


(RGB)


(CMYK)

The effect is subtle, but notice the overall color shift, particularly in the yellow-green area. This is more than just an aesthetic issue: A color shift can affect the validity of your graphics!

If you have access to graphic arts software such as Adobe Illustrator, CorelDraw, or the open-source Inkscape, by all means use them. Open your EPS art files, convert the colors, resave as EPS.

Users of Mathematica, MatLab, Maple, and other CAS systems with drawing capabilities can set the CMYK color model in these applications; please consult your application's documentation.

8.2 EPS from Macintosh OS X

Mac OS X uses pdf technology as part of the operating system. Among it's capabilities is an option to save nearly any file in PDF, PostScript, or EPS formats. Unfortunately, this does not translate into portability. Due to OS X's unique font handling, labels are frequently translated into gibberish (or vanish altogether) on other operating systems. An example:

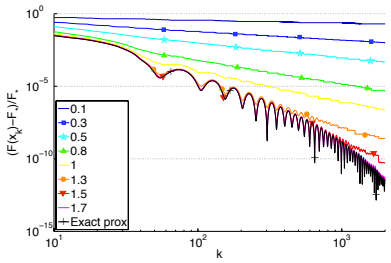

Figure 1: As supplied.

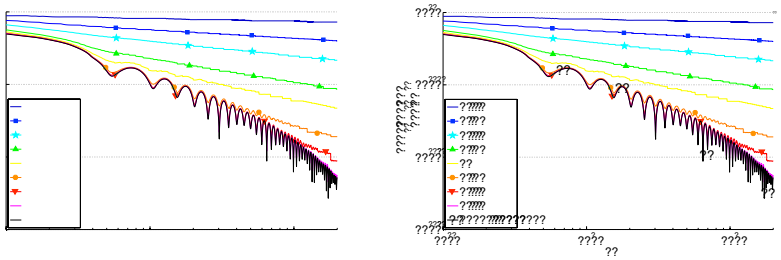

Figure 2: Opened for editing.

Remedy: Do not use this facility for saving your art. Use a drawing application (see above) to resave your art in EPS format.

8.3 Line weights

The following table shows various line "weights" or thicknesses, in different colors.

Extremely thin lines can be all but invisible when printed, particularly in color. We recommend using a minimal line weight of 0.5 points. Be sure to meet this requirement when scaling artwork down in size from within your LaTeX document.