

# GUIDE TO USING SIAM'S L<sup>A</sup>T<sub>E</sub>X STYLE\*

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**Abstract.** Documentation is given for use of the SIAM L<sup>A</sup>T<sub>E</sub>X macros. Instructions and suggestions for compliance with SIAM style standards are also included. Familiarity with standard L<sup>A</sup>T<sub>E</sub>X commands is assumed.

**Key words.** L<sup>A</sup>T<sub>E</sub>X, B<sub>I</sub>B<sub>T</sub>E<sub>X</sub>, SIAM Journals

**AMS subject classifications.**

**1. Introduction.** This file is documentation for the SIAM L<sup>A</sup>T<sub>E</sub>X style, including how to typeset the main document, the B<sub>I</sub>B<sub>T</sub>E<sub>X</sub> file, and any supplementary material. More information about SIAM's editorial style can be found in the style manual, available at <http://www.siam.org/journals/pdf/stylemanual.pdf>. The SIAM latex files can be found at <http://www.siam.org/journals/auth-info.php>. The files that are distributed are given below.

- `siamart.cls` (required): Main L<sup>A</sup>T<sub>E</sub>X class file.
- `siamplain.bst` (required): Bibliographic style file for B<sub>I</sub>B<sub>T</sub>E<sub>X</sub>.
- `docsiamart.tex`: Produces this documentation.
- `references.bib`: B<sub>I</sub>B<sub>T</sub>E<sub>X</sub> database for this documentation and examples.
- `ex.article.tex`: Template for article.
- `ex.supplement.tex`: Template for supplement.
- `ex.shared.tex`: Template for shared information for article and supplement.

The outline of a SIAM L<sup>A</sup>T<sub>E</sub>X article is shown in [Example 1](#).

## Example 1: Document outline

```
\documentclass{siamart}

% Packages and macros definitions go here.

\begin{document}

% Front matter goes here: title, authors, abstract, etc.
% Main body goes here.
% Appendices goes here (optional).
% Acknowledgements go here (optional).
% Bibliography goes here.

\end{document}
```

Class options can be included in the bracketed argument of the command, separated by commas.

- `review` — Creates line numbers using the `lineno` package. Recommended for submitting your manuscript to a SIAM journal.

---

\*Acknowledgments such as funding go here.

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- **final** — By default, lines which 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. Enabling this option turns these boxes off, so that very small margin breaks which are not noticeable will not cause boxes to be generated.
- **supplement** — Specifies that the file is a supplement and not the main document, causing changes in the appearance of the title and numbering; see [section 10](#) for details.
- **hidelinks** — Turns off colors on hyperlinks. The hyperlinks still exist, but there is no color to differentiate them. The final published version will have this option on.

**2. Front matter.** The title and author parts are formatted using the standard `\title`, `\author`, and `\maketitle` commands as described in Lamport [4]. If there is more than one author, the authors should be separated by the `\and` command. The addresses and support acknowledgments are added via `\thanks`. Each author's thanks should specify their address. The support acknowledgment should be put in a thanks for the title, unless specific support needs to be specified for individual authors, in which case it should follow the author address. The header for this file was produced by the code in [Example 2](#), including an example of a shared footnote.

#### Example 2: Title and authors

```
\title{Guide to Using SIAM's \LaTeX\ Style%
  \thanks{Acknowledgments such as funding go here.}}

\subtitle{\today}

\author{Dianne Doe%
  \thanks{Imagination Corp., Chicago, IL (\email{ddoe@imag.com}).}%
  \and
  Paul T. Frank%
  \thanks{Department of Applied Mathematics, Fictional University, Boise,
    ID
    (\email{ptfrank@fictional.edu}, \email{jesmith@fictional.edu}).}%
  \and
  Jane E. Smith%
  \footnotemark[3]
}

\maketitle
```

[Example 3](#) shows how to specify the page headings, with the authors' names and the title (possibly shortened to fit).

#### Example 3: Page headers

```
\pagestyle{myheadings}
\thispagestyle{plain}
\markboth{\MakeUppercase{Dianne Doe, Paul T. Frank, and Jane E. Smith}}%
{\MakeUppercase{SIAM'S \LaTeX\ Style}}
```

Following the author and title is the abstract, key words listing, and AMS subject classifications, designated using the `abstract`, `keywords`, and `AMS` environments. Authors are responsible for providing AMS numbers which can be found on the AMS

web site [1]. The abstract, keywords, and AMS subject classifications for this document were specified in Example 4.

#### Example 4: Abstract, keywords, and AMS classifications

```
\newcommand{\BibTeX}{\{\scshape Bib\}\TeX\space} % <- Preamble
\begin{abstract}
  Documentation is given for use of the SIAM \LaTeX\ macros.
  Instructions and suggestions for compliance with SIAM style
  standards are also included. Familiarity with standard \LaTeX\
  commands is assumed.
\end{abstract}

\begin{keywords}
  \LaTeX, \BibTeX, SIAM Journals
\end{keywords}

\begin{AMS}
\end{AMS}
```

**3. Cross-references and hyperlinks.** SIAM now supports cross-references and hyperlinks via the `cleveref` and `hyperef` packages.

**3.1. Cleveref.** SIAM uses the `cleveref` package for cross-referencing, including customizations to adhere to SIAM's style guidelines. This package enhances L<sup>A</sup>T<sub>E</sub>X's cross-referencing features, allowing the format of cross-references to be determined automatically according to the "type" of cross-reference (equation, section, etc.) and the context in which the cross-reference is used.

To create a cross reference, use the commands `\cref` (inside sentence) and `\Cref` (beginning of a sentence) in place of the object name and `\ref`; examples are shown in the sections below for equations, tables, figures, sections, etc. Note that this package *automatically* inserts the object name as well as the appropriate hyperlink. Hence, it is important to use `\cref{tab:a}` rather than `Table~\ref{tab:a}` so that hyperlinking will work correctly. It may require two L<sup>A</sup>T<sub>E</sub>X compilations for the references to show up correctly.

**3.2. Hyperef.** Hyperlinks are created with the `\href` and `\url` commands, as shown in Example 5. SIAM has also defined the `\email` command, as shown in Example 2. You can hide links (i.e., turn off link colors) with the `hidelinks` option.

#### Example 5: Creating hyperlinks

Click `\href{http://www.siam.org}{here}` to go to the SIAM homepage;  
the `\url` is `\url{http://www.siam.org}`.

Click [here](http://www.siam.org) to go to the SIAM homepage; the url is <http://www.siam.org>.

**4. Math and equations.** Here we show some example equations, with numbering, and examples of referencing the equations. SIAM now includes the package `amsmath` by default. The SIAM L<sup>A</sup>T<sub>E</sub>X class adds the following macros by default: `\const`, `\diag`, `\grad`, `\Range`, `\rank`, `\supp`. This have the effect of rendering the item as a mathop. Examples 6 to 13 use many of the features of the package `amsmath` and examples from [5].

### Example 6: Blackboard math

`\usepackage{amsfonts} % <- Preamble`  
 Blackboard bold characters, such as  $\mathbb{C}$  and  $\mathbb{R}$ , should be created with the `\texttt{amsfonts}` package, although this is not included by default.

Blackboard bold characters, such as  $\mathbb{C}$  and  $\mathbb{R}$ , should be created with the `amsfonts` package, although this is not included by default.

### Example 7: In-line math

The following shows normal setup of math in text:  
 Let  $S = [s_{ij}]$  ( $1 \leq i, j \leq n$ ) be a  $(0, 1, -1)$ -matrix of order  $n$ .

The following shows normal setup of math in text: Let  $S = [s_{ij}]$  ( $1 \leq i, j \leq n$ ) be a  $(0, 1, -1)$ -matrix of order  $n$ .

### Example 8: In-line matrix

Matrices of no more than two rows appearing in text can be created as shown in the next example:

`$B = \bigl[ \begin{smallmatrix} B_{11} & B_{12} \\ B_{21} & B_{22} \end{smallmatrix} \bigr]`.

Matrices of no more than two rows appearing in text can be created as shown in the next example:  $B = \begin{bmatrix} B_{11} & B_{12} \\ B_{21} & B_{22} \end{bmatrix}$ .

### Example 9: Creating matrices

Display matrices can be rendered using environments from `\texttt{amsmath}`:

```
\begin{equation}\label{eq:matrices}
  S=\begin{bmatrix} 1&0\\0&0\end{bmatrix}
  \quad\text{and}\quad
  C=\begin{pmatrix} 1&0\\1&0\end{pmatrix}.
\end{equation}
Equation \cref{eq:matrices} shows some example matrices.
```

Display matrices can be rendered using environments from `amsmath`:

$$(1) \quad S = \begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix} \quad \text{and} \quad C = \begin{pmatrix} 1 & 1 & 0 \\ 1 & 1 & 0 \\ 0 & 0 & 0 \end{pmatrix}.$$

Equation (1) shows some example matrices.

**Example 10: Using SIAM-defined macros**

```
\usepackage{braket,amsfonts} % <- Preamble
An example of a SIAM macro:
\begin{equation}\label{eq:range}
  \Range(A) = \set{ y \in \mathbb{R}^n \mid y = Ax }
\end{equation}
```

An example of a SIAM macro:

$$(2) \quad \text{Range}(A) = \{ y \in \mathbb{R}^n \mid y = Ax \}$$

**Example 11: Equation split across lines**

We claim that the projection  $g(U, V)$  is given by the pair of matrices:

```
\begin{multline} \label{eq:ml}
  g(U, V) = \biggl( \frac{R(U, V)V\Sigma^T U^T}{U\Sigma V^T R(U, V)^2 U} - \\
  \frac{R(U, V)^T U\Sigma V^T - V\Sigma^T U^T R(U, V)}{\Sigma^T U^T R(U, V)^2 V} \biggr).
\end{multline}
```

We claim that the projection  $g(U, V)$  is given by the pair of matrices:

$$(3) \quad g(U, V) = \left( \frac{R(U, V)V\Sigma^T U^T - U\Sigma V^T R(U, V)^T}{2} U, \right. \\ \left. \frac{R(U, V)^T U\Sigma V^T - V\Sigma^T U^T R(U, V)}{2} V \right).$$

**Example 12: Subequations**

We calculate the Fréchet derivative of  $F$  as follows:

```
\begin{subequations}
\begin{align}
  F'(U, V)(H, K) \\
  &= \langle \langle R(U, V), H\Sigma V^T + U\Sigma K^T - \\
  &P(H\Sigma V^T + U\Sigma K^T) \rangle \rangle \label{eq:aa} \\
  &= \langle \langle R(U, V), H\Sigma V^T + U\Sigma K^T \rangle \rangle \\
  &\quad \nonumber \\
  &= \langle \langle R(U, V)V\Sigma^T, H \rangle + \\
  &\quad \langle \langle \Sigma^T U^T R(U, V), K^T \rangle \rangle. \label{eq:bb}
\end{align}
\end{subequations}
\Cref{eq:aa} is the first line, and \cref{eq:bb} is the last line.
```

We calculate the Fréchet derivative of  $F$  as follows:

$$(4a) \quad F'(U, V)(H, K) = \langle R(U, V), H\Sigma V^T + U\Sigma K^T - P(H\Sigma V^T + U\Sigma K^T) \rangle \\ = \langle R(U, V), H\Sigma V^T + U\Sigma K^T \rangle$$

$$(4b) \quad = \langle R(U, V)V\Sigma^T, H \rangle + \langle \Sigma^T U^T R(U, V), K^T \rangle.$$

Equation (4a) is the first line, and (4b) is the last line.

**Example 13: Aligned equations**

```
\Cref{eq:a,eq:b,eq:c} show three aligned equations.
\begin{align}
f &= g \label{eq:a}, \\
f' &= g' \label{eq:b}, \quad \text{and} \\
\mathcal{L}f &= \mathcal{L}g \label{eq:c}.
\end{align}
```

Equations (5–7) show three aligned equations.

$$\begin{array}{ll} (5) & f = g, \\ (6) & f' = g', \quad \text{and} \\ (7) & \mathcal{L}f = \mathcal{L}g. \end{array}$$

**5. Theorem-like environments.** SIAM uses the `ntheorem` package. Several theorem-like environments are predefined:

- `theorem`
- `lemma`
- `corollary`
- `definition`
- `proposition`

SIAM also defines a `proof` environment that automatically inserts a  $\square$  at the end of any proof, even if it ends in an equation environment. *Note that the document may need to be compiled twice for the mark to appear.* Some of the calculus examples were adapted from <http://tutorial.math.lamar.edu/Classes/CalcI/MeanValueTheorem.aspx>.

**Example 14: Theorem**

```
\begin{theorem}[Mean Value Theorem]\label{thm:mvt}
Suppose  $f$  is a function that is continuous on the closed interval
 $[a,b]$ . and differentiable on the open interval  $(a,b)$ .
Then there exists a number  $c$  such that  $a < c < b$  and
\begin{displaymath}
f'(c) = \frac{f(b)-f(a)}{b-a}.
\end{displaymath}
In other words,
\begin{displaymath}
f(b)-f(a) = f'(c)(b-a).
\end{displaymath}
\end{theorem}
```

**THEOREM 1** (Mean Value Theorem). *Suppose  $f$  is a function that is continuous on the closed interval  $[a, b]$ . and differentiable on the open interval  $(a, b)$ . Then there exists a number  $c$  such that  $a < c < b$  and*

$$f'(c) = \frac{f(b) - f(a)}{b - a}.$$

*In other words,*

$$f(b) - f(a) = f'(c)(b - a).$$

## Example 15: Corollary and proof

```

\begin{corollary}
  Let  $f(x)$  be continuous and differentiable everywhere. If  $f(x)$ 
  has at least two roots, then  $f'(x)$  must have at least one root.
\end{corollary}
\begin{proof}
  Let  $a$  and  $b$  be two distinct roots of  $f$ .
  By \cref{thm:mvt}, there exists a number  $c$  such that
  \begin{displaymath}
    f'(c) = \frac{f(b)-f(a)}{b-a} = \frac{0-0}{b-a} = 0.
  \end{displaymath}
\end{proof}

```

COROLLARY 2. *Let  $f(x)$  be continuous and differentiable everywhere. If  $f(x)$  has at least two roots, then  $f'(x)$  must have at least one root.*

*Proof.* Let  $a$  and  $b$  be two distinct roots of  $f$ . By [Theorem 1](#), there exists a number  $c$  such that

$$f'(c) = \frac{f(b) - f(a)}{b - a} = \frac{0 - 0}{b - a} = 0. \quad \square$$

SIAM provides commands to create your own theorem-, definition-, and remark-like environments:

- `newsiamthm` - Small caps header, italicized body.
- `newsiamdefn` - Small caps header, normal body.
- `newsiamremark` - Italics header, normal body.

There are formatted as described in [\[9\]](#).

## Example 16: New theorem-like environment

```

\newsiamthm{claim}{Claim} % <- Preamble
\begin{claim}\label{cl:constant}
  If  $f'(x) = 0$  for all  $x$  \in  $(a,b)$  then  $f(x)$  is constant on  $(a,b)$ .
\end{claim}
\begin{proof}
  Left to reader.
\end{proof}

```

CLAIM 3. *If  $f'(x) = 0$  for all  $x \in (a, b)$  then  $f(x)$  is constant on  $(a, b)$ .*

*Proof.* Left to reader.  $\square$

## Example 17: New definition-like environment

```

\newsiamdefn{defn}{Definition} % <- Preamble
\begin{defn}\label{def:sym}
  We say a matrix  $A$  is \emph{symmetric} if  $a_{ij} = a_{ji}$  for all
   $i, j$ .
\end{defn}

```

DEFINITION 4. We say a matrix  $A$  is *symmetric* if  $a_{ij} = a_{ji}$  for all  $i, j$ .

**Example 18: New remark-like environment**

```
\newsiamremark{expl}{Example} % <- Preamble
\begin{expl}[Trivial note]\label{ex:a}
  Let  $f(x) = 2$ . Since  $f'(x) = 0$  for all  $x$ ,  $f$  is constant
  everywhere.
\end{expl}
```

*Example 5* (Trivial note). Let  $f(x) = 2$ . Since  $f'(x) = 0$  for all  $x$ ,  $f$  is constant everywhere.

**Example 19: References**

We can reference multiple types of objects with a single reference:

```
\cref{ex:a,cl:constant,thm:mvt,def:sym}.
```

We can reference multiple types of objects with a single reference: [Example 5](#), [Claim 3](#), [Theorem 1](#), and [Definition 4](#).

**6. Tables.** Table captions should go above the tables. [Example 20](#) shows the code to generate [Table 1](#). This example uses subfloats via the `subfig` package, as well as special column options from the `array` package.

**Example 20: Example table with subtables.**

```
\usepackage{array,subfig} % <- Preamble
\newcolumntype{R}{>{\$}r<{\$}} %
\newcolumntype{V}[1]{>{\$}*{#1}{R@{\$};\;}R<{\$}} %
\begin{table}[htbp]
  \caption{Example table adapted from Kolda and Mayo \cite{KoMa14}.}
  \label{tab:KoMa14}
  \centering
  \subfloat[ $\beta = 1$ ]{
    \begin{tabular}{|c|R|V{3}|c|R@{\$}\pm{\$}\,|l|} \hline
      occ. & \multicolumn{1}{c|}{ $\lambda$ } & \multicolumn{4}{c|}{ $\mathbf{x}$ } & \\ \hline
      fevals & \multicolumn{2}{c|}{time (sec.)} & \multicolumn{4}{c|}{} \\ \hline
      718 & 11.3476 & 0.5544 & 0.3155 & 1.2018 & 0.0977 & 45 & 0.17 & 0.06 \\ \hline
      134 & 3.7394 & 0.2642 & -1.1056 & 0.2657 & -0.3160 & 31 & 0.12 & 0.05 \\ \hline
      144 & 2.9979 & 1.0008 & 0.4969 & -0.0212 & -0.4817 & 31 & 0.12 & 0.05 \\ \hline
      4 & \multicolumn{6}{c|}{\emph{--- Failed to converge ---}} & 0.21 & 0.10 \\ \hline
    \end{tabular}
  }

  \subfloat[ $\beta = -1$ ]{
    \begin{tabular}{|c|R|V{3}|c|R@{\$}\pm{\$}\,|l|} \hline
      occ. & \multicolumn{1}{c|}{ $\lambda$ } & \multicolumn{4}{c|}{ $\mathbf{x}$ } & \\ \hline
      fevals & \multicolumn{2}{c|}{time (sec.)} & \multicolumn{4}{c|}{} \\ \hline
      72 & -1.1507 & 0.2291 & 0.6444 & 0.3540 & -0.8990 & 34 & 0.14 & 0.06 \\ \hline
      150 & -3.2777 & 0.8349 & -0.7603 & -0.3532 & -0.2635 & 33 & 0.14 & 0.07 \\ \hline
      148 & -3.5998 & 1.0486 & 0.6046 & 0.3736 & 0.3971 & 41 & 0.16 & 0.08 \\ \hline
      624 & -6.3985 & 0.1003 & 0.1840 & 0.5305 & 1.2438 & 48 & 0.19 & 0.08 \\ \hline
      4 & \multicolumn{6}{c|}{\emph{--- Converged to wrong solution ---}} & 0.10 & 0.11 \\ \hline
      2 & \multicolumn{6}{c|}{\emph{--- Failed to converge ---}} & 0.23 & 0.02 \\ \hline
    \end{tabular}
  }
\end{table}
```

**7. Figures.** It is recommended that all figures be generated as encapsulated postscript (EPS) format, since this will be used in final production. Since most people work in `pdflatex`, we recommend the package `epstopdf` to automatically convert EPS images to PDF for inclusion in PDF documents created by `pdflatex`. [Example 21](#) shows the code to generate [Figure 1](#). This example uses the `graphicx` package for the `\includegraphics` command.



Table 1: Example table adapted from Kolda and Mayo [3].

(a)  $\beta = 1$ 

occ.	$\lambda$	$\mathbf{x}$	fevals	time (sec.)
718	11.3476	[ 0.5544 0.3155 1.2018 0.0977 ]	45	$0.17 \pm 0.06$
134	3.7394	[ 0.2642 -1.1056 0.2657 -0.3160 ]	31	$0.12 \pm 0.05$
144	2.9979	[ 1.0008 0.4969 -0.0212 -0.4817 ]	31	$0.12 \pm 0.05$
4	— Failed to converge —			$0.21 \pm 0.10$

(b)  $\beta = -1$ 

occ.	$\lambda$	$\mathbf{x}$	fevals	time (sec.)
72	-1.1507	[ 0.2291 0.6444 0.3540 -0.8990 ]	34	$0.14 \pm 0.06$
150	-3.2777	[ 0.8349 -0.7603 -0.3532 -0.2635 ]	33	$0.14 \pm 0.07$
148	-3.5998	[ 1.0486 0.6046 0.3736 0.3971 ]	41	$0.16 \pm 0.08$
624	-6.3985	[ 0.1003 0.1840 0.5305 1.2438 ]	48	$0.19 \pm 0.08$
4	— Converged to wrong solution —			$0.10 \pm 0.11$
2	— Failed to converge —			$0.23 \pm 0.02$

Example 21: Example figure with subfigures and external files

```

\usepackage{graphicx,epstopdf,subfig} % <- Preamble
\begin{figure}[htbp]
  \centering
  \subfloat[ $\epsilon_{\max}=5$ ]{\label{fig:a}\includegraphics{example_fig1}}
  \subfloat[ $\epsilon_{\max}=0.5$ ]{\label{fig:b}\includegraphics{example_fig2}}
  \caption{Example figure using external image files.}
  \label{fig:testfig}
\end{figure}

```

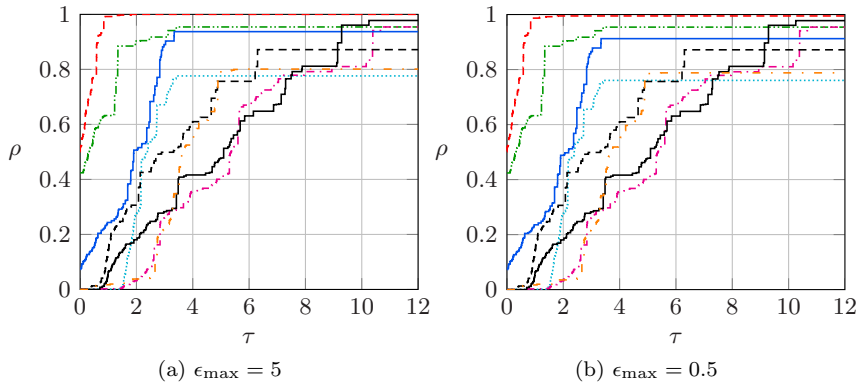


Fig. 1: Example figure using external image files.

Another option is to use a graphics-generator that is platform- and format-independent. PGF is a TeX macro package for generating such graphics and works together with the most important TeX backend drivers, including pdftex and dvips. It comes with a user-friendly syntax layer called TikZ. More details can be found at

<http://sourceforge.net/projects/pgf/>, and detailed instructions are available in the manual. Example 22 shows the code to generate Figure 2, which uses TikZ/PGF. This example was written by Henri Menke at <http://texwelt.de/wissen/fragen/4912/skizze-zur-illustration-linearer-regression>.

Example 22: Example TikZ/PGF for platform-independent graphics.

```
\usetikzlibrary{arrows,intersections} % <- Preamble
\begin{figure}[htbp]
  \centering
  \begin{tikzpicture}[
    thick,
    >stealth',
    dot/.style = {
      draw,
      fill = white,
      circle,
      inner sep = 0pt,
      minimum size = 4pt
    }
  ]
    \coordinate (O) at (0,0);
    \draw[->] (-0.3,0) -- (8,0) coordinate[label = {below:$x$}] (xmax);
    \draw[->] (0,-0.3) -- (0,5) coordinate[label = {right:$f(x)$}] (ymax);
    \path[name path=x] (0.3,0.5) -- (6.7,4.7);
    \path[name path=y] plot[smooth] coordinates {(-0.3,2) (2,1.5) (4,2.8) (6,5)};
    \scope[name intersections = {of = x and y, name = i}]
      \fill[gray!20] (i-1) -- (i-2 |- i-1) -- (i-2) -- cycle;
      \draw (0.3,0.5) -- (6.7,4.7) node[pos=0.8, below right] {Sekante};
      \draw[red] plot[smooth] coordinates {(-0.3,2) (2,1.5) (4,2.8) (6,5)};
      \draw (i-1) node[dot, label = {above:$P$}] (i-1) {} -- node[left]
        {$f(x_0)$} (i-1 |- 0) node[dot, label = {below:$x_0$}] {};
      \path (i-2) node[dot, label = {above:$Q$}] (i-2) {} -- (i-2 |- i-1)
        node[dot] (i-12) {};
      \draw (i-12) -- (i-12 |- 0) node[dot,
        label = {below:$x_0 + \varepsilon$}] {};
      \draw[blue, <->] (i-2) -- node[right] {$f(x_0 + \varepsilon) - f(x_0)$}
        (i-12);
      \draw[blue, <->] (i-1) -- node[below] {$\varepsilon$} (i-12);
      \path (i-1 |- 0) -- node[below] {$\varepsilon$} (i-2 |- 0);
      \draw[gray] (i-2) -- (i-2 |- xmax);
      \draw[gray, <->] ([xshift = -0.5cm]i-2 |- xmax) -- node[fill = white]
        {$f(x_0 + \varepsilon)$} ([xshift = -0.5cm]xmax);
    \endscope
  \end{tikzpicture}
  \caption{Example TikZ figure by Henri Menke.}
  \label{fig:tikz}
\end{figure}
```

**8. Algorithms.** SIAM automatically includes the `algorithm` package in the class definition. Users have the choice of `algpseudocode`, `algorithmic`, and other packages for formatting the algorithm. For example, Algorithm 1 is produced by the code in Example 23. In order to reference lines within the algorithm, we need to tell the `cleveref` package how to do the referencing, which is the second line of Example 23. Then we can use the code `\cref{line3}` to produce Line 3.

**From TKG:** SIAM wants the algorithm caption to be small caps, but I'm not sure why because this does not match the table and figures.

**9. Sections.** Sections are denoted using standard L<sup>A</sup>T<sub>E</sub>X section commands, i.e., `\section`, `\subsection`, etc. The appendices are defined the same way except that the first one is preceded by the `\appendix` command. The acknowledgments section comes immediately before the references and after any appendices. It should be declared by `\section*{Acknowledgments}`. Any numbered, labeled sections can be referenced using `\cref`.

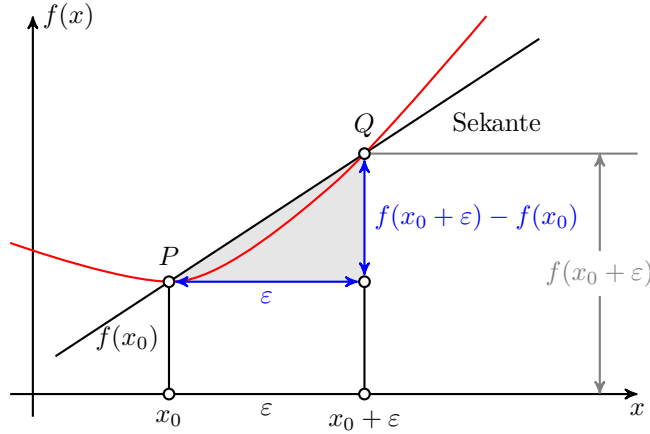


Fig. 2: Example TikZ figure by Henri Menke.

## Example 23: Example algorithm

```

\usepackage{algorithmic} % <- Preamble
\crefname{ALC@unique}{Line}{Lines} % <- Preamble
\begin{algorithm}
\caption{Build tree}
\label{alg:buildtree}
\begin{algorithmic}[1]
\STATE{Define  $\mathcal{P} := T := \{\text{ } \{1\}, \text{ } \ldots, \text{ } \{d\}\}$ }
\WHILE{ $\#\mathcal{P} > 1$ }
\STATE{\label{line3}{Choose  $C^{\text{prime}} \in \mathcal{C}_p(P)$  with  $C^{\text{prime}} :=$   

 $\operatorname{argmin}_{C \in \mathcal{C}_p(P)} \varrho(C)$ }}
\STATE{Find an optimal partition tree  $T_{C^{\text{prime}}}$ }
\STATE{Update  $\mathcal{P} := (\mathcal{P} \setminus C^{\text{prime}}) \cup \{\bigcup_{t \in C^{\text{prime}}} t\}$ }
\STATE{Update  $T := T \cup \{\bigcup_{t \in \tau} t : \tau \in T_{C^{\text{prime}}} \setminus \{C^{\text{prime}}\}\}$   

 $\mathcal{L}(T_{C^{\text{prime}}})\}$ }
\ENDWHILE
\RETURN  $T$ 
\end{algorithmic}
\end{algorithm}

```

**10. Supplemental material.** For several SIAM journals, authors are encouraged to submit Supplementary Materials to complement their articles. This might include additional figures or examples, animations, data sets used in the paper, computer code used to generate figures or tables, or other materials that are necessary to fully document the research contained in the paper or to facilitate the readers' ability to understand and extend the work.

The class option `supplement` must be declared. The supplement should have the same title and authors as the main document. (Note that the title is modified automatically by the SIAM class file so that it is preceded by the text "Supplementary Materials:"). A supplement does have sections but does not have an abstract, keywords, AMS classifications, or appendices. The main document and supplement can cross-reference sections, equations, theorem-like declarations, figures, tables, algorithms, etc. However, there is no sharing of references. The references are optional for a supplement.

The included files, `ex_article.tex`, `ex_shared.tex`, and `ex_supplement.tex`, provide a template that can be used for creating a L<sup>A</sup>T<sub>E</sub>X supplement.

**Algorithm 1** Build tree

---

```

1: Define  $P := T := \{\{1\}, \dots, \{d\}\}$ 
2: while  $\#P > 1$  do
3:   Choose  $C' \in \mathcal{C}_p(P)$  with  $C' := \operatorname{argmin}_{C \in \mathcal{C}_p(P)} \varrho(C)$ 
4:   Find an optimal partition tree  $T_{C'}$ 
5:   Update  $P := (P \setminus C') \cup \{\bigcup_{t \in C'} t\}$ 
6:   Update  $T := T \cup \{\bigcup_{t \in \tau} t : \tau \in T_{C'} \setminus \mathcal{L}(T_{C'})\}$ 
7: end while
8: return  $T$ 

```

---

The `supplement` class option changes the appearance of the title (preceded by “Supplementary Materials”) and the numbering so that all sections, equations, figures, tables, algorithms, and so on to start with “S”. As mentioned above, the title and authors should be identical to the main document.

[Example 24](#) (from `ex_shared.tex`) shows how the “shared” title and authors may be defined across the main document and a supplement. We have to manually capitalize the title in the `\title` command via `\MakeUppercase` because the automatic uppercase does not work with macros. Likewise, we have to manually make the authors and title uppercase in the running headers that are set via the `\pagestyle` command. Note also that we manually insert `\siampretitle` in the title name. This macro is empty except for supplements, in which case it is set to ‘Supplementary Materials:’. Optionally, we can also declare the PDF title and authors.

Cross-referencing between the main document and the supplement is enabled using the `xr-hyperref` package (included by the classfile). Use `\externaldocument` to specify the external document to search for external references.

[Example 25](#) shows the general outline of a supplement file that used a shared file for specifying the command `\TitleAndAuthorCommands` (see [Example 24](#)) as well as how to set up cross-referencing.

**Example 25: Supplement document outline**

```

\documentclass[supplement]{siamart}
\input{ex_shared}
\externaldocument{ex_article}

\begin{document}

\thispagestyle{plain}
\TitleAndAuthorCommands
\maketitle

% No abstract, keywords, subject classifications.
% Main body goes here.
% No appendices or acknowledgments.
% Optional bibliography goes here.

\end{document}

```

**11. Bibliography.** The SIAM BIBTEX style file, now called `siamplain.bst`, has been updated to include the new keys listed below:

## Example 24: Example of shared title and author macros

```

% Full title for title and pdftitle
\newcommand{\TheTitle}{An Example Article}
% Short title for running head
\newcommand{\TheShortTitle}{An Example Article}
% Full author list, but not thanks, for pdfauthor
\newcommand{\TheAuthors}{Dianne Doe, Paul T. Frank, and Jane E. Smith}
% Short author list for running head
\newcommand{\TheShortAuthors}{D. Doe, P. T. Frank, and J. E. Smith}

% Title and Author. If the supplement option is on, then
% "Supplementary Material" is automatically inserted before the title.
\newcommand{\TitleAndAuthorCommands}{%
\title{\MakeUppercase{\TheTitle}\thanks{This work was funded by the Frog
  Research Institute under contract no.~FRI-454.}}
\author{Dianne Doe%
  \thanks{Imagination Corp., Chicago, IL (\email{ddoe@imag.com}).}%
  \and
  Paul T. Frank%
  \thanks{Department of Applied Mathematics, Fictional University, Boise,
    ID
    (\email{ptfrank@fictional.edu}, \email{jesmith@fictional.edu}).}
  \and
  Jane E. Smith%
  \footnotemark[3]}
}

% Declare page headings - use the \siamprettitle command, which inserts
% "Supplementary Material" when appropriate.
\pagestyle{myheadings}
\markboth{\MakeUppercase{\TheAuthors}}%
{\MakeUppercase{\siamprettitle\TheShortTitle}}

% Optional: Set up PDF title and authors
\hypersetup{%
  pdftitle={\siamprettitle\TheTitle},
  pdfauthor={\TheAuthors}
}

```

- `doi`: Digital object identifier, a unique alphanumeric string
- `url`: Web address, usually impermanent
- `urldate`: Date that the web address was last accessed
- `eprint`: Archive identifier, a unique alphanumeric string
- `eprintclass`: Archive class
- `archive`: Archive URL, defaults to `http://arXiv.org/abs`
- `archivepreprint`: Archive name, defaults to “arXiv”.
- `eid`: Article ID, if there are no page numbers
- `pagetotal`: Total number of pages, for use with article ID

Every entry type has been modified to include an optional link to a DOI, a URL, and/or an archive preprint reference. Additionally, the `article` entry now supports an Article ID, `eid`, and number of pages, `pagetotal`. To use this, include the

following code in your L<sup>A</sup>T<sub>E</sub>X source code: `\bibliographystyle{siamplain}`.

**11.1. DOI.** A digital object identifier (DOI) is a unique alphanumeric string that provides a persistent link to its location on the Internet. The publisher assigns a DOI when your article is published and made available electronically. Using the `doi` field in BibT<sub>E</sub>X to specify it, as shown for [3] in Example 26; observe the new `doi` field which produces a hyperlink in the citation. Do not include the full URL, i.e., `http://dx.doi.org/` preceding the DOI.

#### Example 26: Example article in BibT<sub>E</sub>X

```
@Article{KoMa14,
  title =      {An Adaptive Shifted Power Method for Computing
                Generalized Tensor Eigenpairs},
  author =     {Tamara G. Kolda and Jackson R. Mayo},
  doi =        {10.1137/140951758},
  journal =    {SIAM Journal on Matrix Analysis and Applications},
  number =     4,
  volume =     35,
  year =       2014,
  month =      dec,
  pages =      {1563--1581},
}
```

**11.2. URL.** There is also now support for the `url` field. Generally, the DOI is preferred to the URL, since the DOIs should be a permanent references. For that reason, it is good practice to specify the last date that the URL was accessed, which is specified by the optional `urldate` field. Reference [2] produced by Example 27 shows an example of using these fields.

#### Example 27: Example with the URL field in BibT<sub>E</sub>X

```
@Misc{Hi14,
  author =     {Nick Higham},
  title =      {A Call for Better Indexes},
  howpublished = {SIAM Blogs},
  year =       2014,
  month =      nov,
  url =        {http://blogs.siam.org/a-call-for-better-indexes/},
  urldate =    {2015-04-05}
}
```

**11.3. Preprint servers such as arXiv.** More and more manuscripts are available on preprint servers. In fact, SIAM's publication policy explicitly allows the final accepted version of any article to be posted on a preprint server such as arXiv.

For an arXiv paper, the `eprint` field is used to specify identifier. The optional `eprintclass` field specifies the class. Example 28 shows the BibT<sub>E</sub>X for [7].

**Example 28: Example arXiv reference in BIB<sub>T</sub>E<sub>X</sub>**

```

@Misc{PeKoPi14,
  title = {Accelerating Community Detection by Using {K}-core Subgraphs},
  author = {Chengbin Peng and Tamara G. Kolda and Ali Pinar},
  eprint = {1403.2226},
  year = 2014,
  month = mar,
  eprintclass = {math.NA}
}

```

Other preprint servers are supported as well, but these require specification of the `archive` and `archiveprefix`. In this case, the target URL is formed by concatenating the `archive`, a forward slash (/), and the `eprint`; and the text for the hyperlink is formed by concatenating the `archiveprefix`, a color (:), and the `eprint`. [Example 29](#) shows the code to generate [8], including the preprint from PubMed. Note that this example has both the journal citation as well as the link for the preprint.

**Example 29: Example PubMed reference in BIB<sub>T</sub>E<sub>X</sub>**

```

@Article{WoZhMeSh05,
  author = {Woessner, Donald E. and Zhang, Shanrong and
    Merritt, Matthew E. and Sherry, A. Dean},
  title = {Numerical Solution of the {Bloch} Equations Provides Insights
    into the Optimum Design of {PARACEST} Agents for {MRI}},
  journal = {Magnetic Resonance in Medicine},
  doi = {10.1002/mrm.20408},
  volume = 53,
  number = 4,
  month = apr,
  year = 2005,
  pages = {790--799},
  archiveprefix = {PubMed},
  archive = {http://www.ncbi.nlm.nih.gov/pubmed},
  eprint = {15799055}
}

```

**11.4. Article ID.** Some journals use an article ID rather than page numbers. The field `eid` specifies the article ID. The optional field `pagetotal` can say the number of pages in the document. An example of an article using these fields is shown in [Example 30](#) for citation [6].

## Example 30: Example article ID reference in BibTeX

```
@Article{Ne03,
  title =      {Properties of Highly Clustered Networks},
  author =     {Newman, M. E. J.},
  doi =        {10.1103/PhysRevE.68.026121},
  journal =    {Phys. Rev. E},
  volume =     {68},
  year =       {2003},
  eid =        {026121},
  pagetotal =  {6},
  month =      aug,
}
```

**To do:** The new siam bib file is called `siamplain.bst`. There could also be a `siamalpha.bst` for alphabetic style references per the request of David Gleich.

## REFERENCES

- [1] AMERICAN MATHEMATICAL SOCIETY, *Mathematics Subject Classification*, 2010, <http://www.ams.org/mathscinet/msc/msc2010.html> (accessed 2015/03/29).
- [2] NICK HIGHAM, *A call for better indexes*. SIAM Blogs, Nov. 2014, <http://blogs.siam.org/a-call-for-better-indexes/> (accessed 2015-04-05).
- [3] TAMARA G. KOLDA AND JACKSON R. MAYO, *An adaptive shifted power method for computing generalized tensor eigenpairs*, SIAM Journal on Matrix Analysis and Applications, 35 (2014), pp. 1563–1581, doi:10.1137/140951758.
- [4] LESLIE LAMPORT, *LaTeX: A Document Preparation System*, Addison–Wesley, Reading, MA, 1986.
- [5] FRANK MITTLEBACH AND MICHEL GOOSSENS, *The LaTeX Companion*, Addison–Wesley, 2nd ed., 2004.
- [6] M. E. J. NEWMAN, *Properties of highly clustered networks*, Phys. Rev. E, 68 (2003), 026121 (6 pages), doi:10.1103/PhysRevE.68.026121.
- [7] CHENGBIN PENG, TAMARA G. KOLDA, AND ALI PINAR, *Accelerating community detection by using K-core subgraphs*, Mar. 2014, arXiv:1403.2226 [math.NA].
- [8] DONALD E. WOESSNER, SHANRONG ZHANG, MATTHEW E. MERRITT, AND A. DEAN SHERRY, *Numerical solution of the Bloch equations provides insights into the optimum design of PARACEST agents for MRI*, Magnetic Resonance in Medicine, 53 (2005), pp. 790–799, doi:10.1002/mrm.20408, PubMed:15799055.
- [9] *Siam style manual: For journals and books*, 2013, <https://www.siam.org/journals/pdf/stylemanual.pdf>.

**To do:** This files creates a bunch of extra files as it compiles. Not sure how to remove them.