

INSTRUCTIONS FOR AUTHORS ON HOW TO USE THE AMCS L^AT_EX CLASS

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This paper describes how to use the `amcs` class with L^AT_EX2e to produce papers suitable for publication in the *International Journal of Applied Mathematics and Computer Science (AMCS)*. The entire paper should be 8–15 pages long (subject to excess page charges), while the abstract to be included here must be composed as one paragraph up to 200 words long, with the maximum width of 155 mm. Please make the abstract concise and avoid incorporating mathematical formulae.

Keywords: keyword 1, keyword 2, ..., keyword 5. Please provide a few keywords (3–5). This section is maximum 155 mm wide, left justified.

1. Introduction

The `amcs.cls` document class is designed to produce papers suitable for publication in the *International Journal of Applied Mathematics and Computer Science*. It is based on the standard `article` L^AT_EX2e class. To properly format the text, the following standard packages are additionally required: `times`, `amsmath`, `amssymb`, `color`, `graphicx`, `caption2` with the option `hang`, `harvard` with the options `dcucite` and `abbr`. Other packages are optional and can be used when required. The text area is defined as follows: the text height is equal to 23.4 cm, the text width is 17 cm, and a two-column mode with the space between the columns equal to 8 mm is used.

Please note that no modifications in the original `amcs.cls` file are allowed. If needed, the authors may include additional definitions and packages in the main paper file. These, however, should not collide with the *AMSC* style. Also, any extra definitions or packages that are not actually used in the paper should be removed from the document preamble. The same refers to the text—the authors are asked not to include unnecessary commented passages in it.

2. Title page

The title area is created using the `\maketitle` command. Before invoking this command, the author has to declare all objects required to appear in the title area.

2.1. Manuscript title. An example title is declared as follows:

```
\title{Numerical analysis of the algorithm}.
```

Line breaks with the command `\protect` may be used to control the length of the title:

```
\title{Numerical analysis\protect\\[+1mm]  
of the algorithm}.
```

The title is used to format the headers of odd pages. The header of each odd page should be left justified and the page number right justified. In the case of a very long title, please use its short version, e.g., the first few words of the title and an ellipsis. The authors can put the short title of the paper in square brackets as an optional parameter of the `\title` command, e.g.,

```
\title[Numerical analysis ...]{Numerical  
analysis of the algorithm}.
```

2.2. Authors' names. The authors' names and affiliations are declared with the `\author` command. Each author can be assigned at most two institutions:

```
\author[Inst1][Inst2]{Author's Name}.
```

If an author is assigned one institution only, the second square brackets should be empty:

```
\author[Inst1][]{Author's Name}.
```

For each author, a separate `\author` command should be run, e.g.,

```
\author[Inst1][First Author's Name]
\author[Inst2][Second Author's Name].
```

Important! The amcs document class permits to declare at most six authors. For each author at least one institution should be declared!

2.3. Institution declaration. To define an author's affiliation, the `\address` command can be used:

```
\address[Inst1]{First affiliation}.
```

The option in square brackets is mandatory in order to assign an author to this institution. For each institution, a separate `\address` command should be run, e.g.,

```
\address[Inst1]{First affiliation}
\address[Inst2]{Second affiliation}.
```

Important! The amcs document class permits to declare at most six institutions.

2.4. Abstract and keywords. The abstract text is encapsulated within the `abstract` environment:

```
\begin{abstract}
The paper deals with ...
\end{abstract}.
```

The list of keywords is defined using the `keywords` environment:

```
\begin{keywords}
Keyword1, keyword2, keyword3 ...
\end{keywords}.
```

2.5. Header of the title page. The header of the title page contains the name of the journal and the following information:

- Publication year, declared with the `\Year{}` command;
- Journal volume number, declared with the `\Vol{}` command;
- Journal issue number, declared with the `\No{}` command;
- Paper final page numbering, declared with the `\Startpage{}` and `Endpage{}` commands, respectively;
- Digital Object Identifier number, declared with the `DOI{}` command.

These commands are used solely by the editorial staff, so the authors are asked to ignore them.

3. Headers

The header of each even page should include names and initials (right justified) and the page number (left justified). To declare the authors' names, please use the `\Runauthors{}` command placed in the document preamble (before `\maketitle`). For one author, give the first character of his/her first name and the full last name, e.g., for John Doe, the appropriate form is

```
\Runauthors{J. Doe}.
```

For two authors, use both authors' names, e.g.,

```
\Runauthors{J. Doe and M. John}.
```

For more than two authors, use the first author's name and "*et al.*", e.g.,

```
\Runauthors{J. Doe \it{et al.}}.
```

The header of each odd page should contain the title of the paper (left justified) and the page number (right justified). To declare the header of each odd page, please use the `\title` command (see Section 2.1).

4. Sections

Sections are defined in a common way by the commands `\section`, `\subsection`, `\subsubsection` and `\paragraph`. Arabic numbers are used for subsequent numbering. A paragraph is a section without a number. Below are examples of section formatting:

4.1. Secondary heading. Section text.

4.1.1. Tertiary heading. Section text.

Paragraph. Section text.

5. Floating material

5.1. Figures. Figures are defined in a standard manner, e.g.,

```
\begin{figure}[!b]
\centering
\includegraphics[width=0.45\textwidth]
{fig1}
\caption{Figure example.}
\label{fig1}
\end{figure}.
```

They should be centred and placed at the top or bottom of a page if possible, as close as possible to the first reference to them. Please avoid middle in-text placement (option `h`), and do not introduce frames around the figures. To use the `\includegraphics` command, the `graphicx` package has to be loaded first. The caption of a figure should be placed below the figure to which it refers

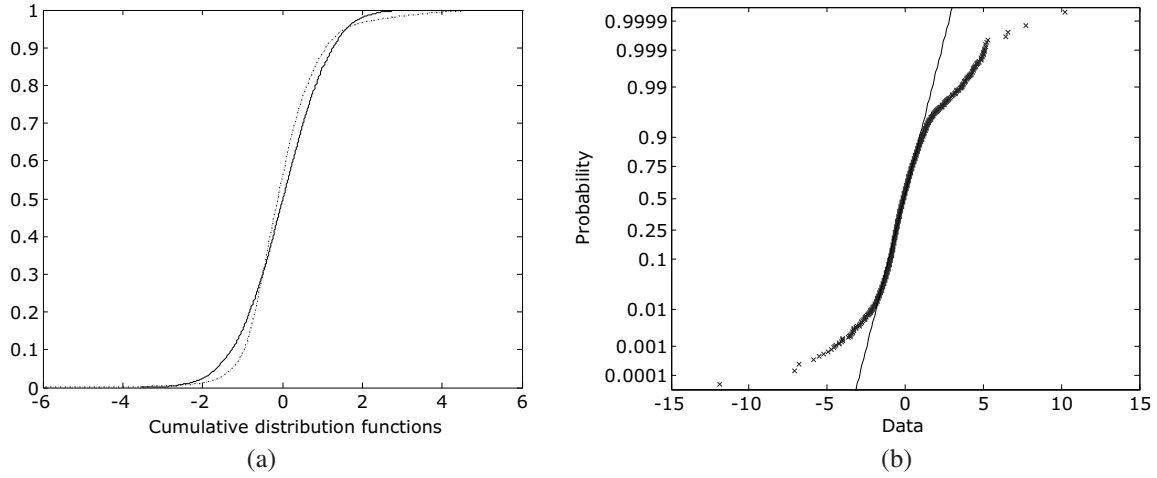


Fig. 2. Sample figure: the first graph (a), the second graph (b).

and should be ended with a full stop. In the case of multiple-part figures, enumerate each piece as (a), (b), etc., including necessary descriptions in the main caption of the figure. Use the `caption` command with the `caption2` package to format figure captions. Make sure you always employ L^AT_EX commands for figure captions and numbering instead of incorporating those into the original graphics.

Sometimes figures are too wide to fit in a single column. Then, a double-column figure environment declared with the `figure*` environment can be used:

```
\begin{figure*}[!t]
\centering
\includegraphics[width=0.405\textwidth]
{fig2a}\hspace{0.5cm}
\includegraphics[width=0.45\textwidth]
{fig2b}\\
(a)\hspace{8cm}(b)
\caption{Sample figure: the first
graph (a), the second graph (b)}
```

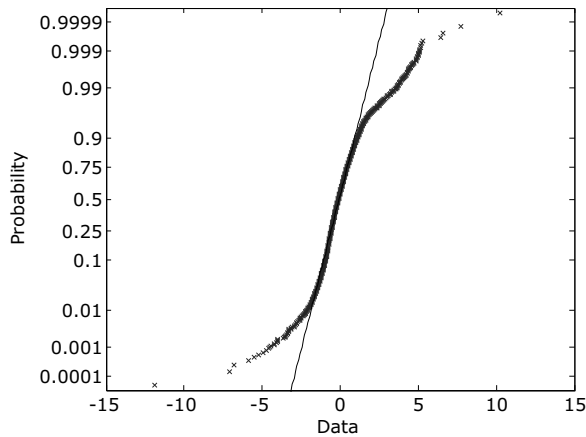


Fig. 1. Figure example.

```
\label{fig2}
\end{figure*}.
```

When referring to figures, the abbreviation “Fig.” should be used. It is also advisable to clearly name the graphic files and their labels, e.g., *fig1*, *fig2a*, *fig2b*, etc.

5.2. Tables. Tables should be centred, at the top or bottom of a page if possible, and as close as possible to the first reference to them. The caption of a table should be placed over the table to which it refers and should be ended with a full stop. For example, the code

```
\begin{table}[!b]
\centering
\caption{Table example}
\label{table1}
\begin{tabular}{|c|c|c|}
\hline
Algorithm & Performance [%] & Calc. time [s]
\hline
gradient & 95 & 100\\
stochastic & 97 & 80\\
evolutionary & 99 & 500\\
\hline
\end{tabular}
\end{table}
```

refers to Table 1. For long tables, please use the `table*` environment.

Table 1. Table example.

Algorithm	Performance [%]	Calc. time [s]
gradient	95	100
stochastic	97	80
evolutionary	99	500

6. Graphics

Encapsulated PostScript (EPS) is the required graphics format. It supports both vector and bitmap images. EPS images can be scaled, rotated and magnified without degrading image quality. The recommended resolution is 300 dpi for halftone graphics and 600 to 1200 dpi for line drawings. Please do not use scanned images!

Any text used in the images should be converted to curves or composed using embedded PostScript Type 1 fonts—this will ensure correct displaying of the figures in the final PDF file. Please do NOT use the `psfrag` option in your graphics—instead, incorporate all descriptions into the actual image.

Important! As AMSC is a monochrome publication, the provided graphics must be in gray scale—any images submitted in colour will be converted to such. Consequently, no in-text references to colour in graphics are allowed. (If needed, readers may be provided with colour graphics via links or contact with the authors—a proper notification should be included in the paper.) Also, please make sure that any fine line drawings such as graphs are legible.

7. Equations

Equations may be typeset with traditional commands such as `\equation`, `\eqnarray`, etc., but the use of the `\amsmath` and `\amssymb` packages is recommended. Each equation should be centred and numbered consecutively, starting from 1. Use arabic numbering in brackets, right justified. Please add (if appropriate) punctuation marks at the end of the formulae, e.g.,

$$J = \sum_{i=1}^N (e_i - y_i^s)^2. \quad (1)$$

Important! Please avoid double-column equations.

8. Theorems and other environments

The `amcs` document class offers a number of environments to declare theorems and related structures.

8.1. Theorems, corollaries, propositions and lemmas.

The following piece of code:

```
\begin{theorem}{Reference}
  Theorem definition xxxxx xxxx xxx xxx xxx
  xxx xxx xxx xxx xx xx xxxxx xxx xxxxxx xxx.
  \label{theorem1}
\end{theorem}
```

results in Theorem 1, where reference to a suitable work is given in the brackets.

Theorem 1. (Werbos, 1974) *Theorem definition xxxxx xxxxx xxx xxx xxx xxx xxx xxx xx xx xxxxx xxx xxxxx xxxxx.*

When referencing is not needed, please leave the curly brackets empty, e.g.,

```
\begin{theorem}{}
  Theorem definition xxxxx xxxxx xxx xxx xxx
  xxx xxx xxx xxx xx xx xxxxx xxx xxxxxx xxx.
  \label{theorem2}
\end{theorem}.
```

The result of the above is as follows:

Theorem 2. *Theorem definition xxxxx xxxxx xxx xxx xxx xxx xxx xxx xxx xx xx xxxxx xxx xxxxx xxx.*

Instead of a reference, a name can be given to the theorem. In much the same way, lemma, corollary and proposition environments are declared.

8.2. Proof environment.

Proofs are handled by the environment

```
\begin{proof}{Reference/Name}
  Proof of theorem xxx xxx xxx xxx xxx xx xx
  xxx xxx xxx xxx xxxxxx xx xx xxxxx xx xx xxx
\end{proof},
```

which results in

Proof. (See Uciński, 1999) Proof of theorem xxx xxx xxx xxx xxx xx xx xxx xxx xxx xxxxxx xx xx xxxxx xx xx xxx, ■

with an optional parameter for a reference or a name, which may be left empty if not needed. The Q.E.D. symbol ■ is automatically placed at the end of each proof.

8.3. Example environment.

Examples are declared by the environment

```
\begin{example}[] {Stability}
  Let us consider an example ... xxx xxx xxx
  xxx xxx xx xx xxx xxx xxx xxx xxxxxx x xx xx
  xxxxx xx xx xxx
\end{example},
```

which results in

Example 1. (*Stability*) Let us consider an example ... xxx xxx xxx xxx xxx xx xx xxx xxx xxx xxxxxx x xx xx xxxxx xx xx xxx. ♦

The symbol ♦ is automatically placed at the end of each example. If this sign is not required, please put the `nosign` option in the brackets, i.e.,

```
\begin{example}[nosign] {Stability}
  Proof of theorem xxx xxx xxx xxx xxx xx xx
  xxx xxx xxx xxx xxxxxx xx xx xxxxx xx xx xxx
\end{example}.
```

8.4. Definitions, problems, remarks and observations.

The following piece of code:

```
\begin{definition}{Definition name}
  Contents of definition xxxxx xxxx xxx xxx
  xxx xxx xxx xxx xx xx xxxxx xxx xxxxxx xxxxx.
  \label{definition1}
\end{definition}
```

results in Definition 1, with the name of the definition given in the brackets.

Definition 1. (*Equivalence rule*) Contents of definition xxxxx xxxx xxx xxx xxx xxx xxx xx xx xxxxx xxx xxxxx xxxxx.

When the name is not needed, please leave the curly brackets empty, e.g.,

```
\begin{definition}{}
  Let  $x(t)$  be ...xxx xxx xxx xxx xxx xx xx
  xxx xxx xxx xxx xxxxx xx xx xxxxx xx xx xxx
\end{definition}.
```

Instead of a name, reference to a suitable work can be given in the brackets. In much the same way, remark, observation and problem environments are declared.

9. Algorithms

The algorithms should be expressed using the `algorithmic` and `algorithm` environments provided by the `algorithmic.sty` and `algorithm.sty` packages, respectively. The `algorithmic` environment provides an environment for describing algorithms while the `algorithm` environment provides a float wrapper for defined algorithms described using the `algorithmic` one. The following piece of code:

```
\begin{algorithm}[!h]
\caption{Selection of the point.}
\begin{algorithmic}[1]
\REQUIRE  $d_1, d_2, \psi$ 
\IF  $\{d_2 > \psi^2\}$ 
\STATE  $a_1 := d_1, a_2 := \psi^2$ 
\COMMENT{region I}
\ELSIF  $\{d_1 \geq 2\psi\}$ 
\STATE  $a_1 := 2\psi, a_2 := \psi^2$ 
\COMMENT{region II}
\ENDIF
\RETURN  $a_1, a_2$ 
\COMMENT{Returns coordinates}
\end{algorithmic}
\end{algorithm}
```

gives the result portrayed below.

Algorithms expressed in a step by step manner can be defined in the following way:

Algorithm 1. Selection of the stationary point.

Require: d_1, d_2, ψ

```
1: if  $d_2 > \psi^2$  then
2:    $a_1 := d_1, a_2 := \psi^2$  {region I}
3: else if  $d_1 \geq 2\psi$  then
4:    $a_1 := 2\psi, a_2 := \psi^2$  {region II}
5: end if
6: return  $a_1, a_2$  {Returns coordinates}
```

```
\begin{algorithm}[!h]
\caption{Robust model designing.}
\label{a:alg1}
\textbf{Step 1.} Compute the residual
 $r = y - y_m$ .
```

```
\smallskip
\textbf{Step 2.} Collect the data
 $\{u_i, r_i\}_{i=1}^N$  and identify
an error model using these data.
```

```
\smallskip
\textbf{Step 3.} Construct a robust
model.
\end{algorithm},
```

which gives Algorithm 2.

Algorithm 2. Robust model designing.

Step 1. Compute the residual $r = y - y_m$.

Step 2. Collect the data $\{u_i, r_i\}_{i=1}^N$ and identify an error model using these data.

Step 3. Construct a robust model.

Algorithms formatted in a different manner cannot be accepted.

10. Acknowledgments

The acknowledgment section is created using the `acknowledgment` environment:

```
\begin{acknowledgment}
  The authors wish to thank ... xx xxx xx x
  xx xx xxx xxx xxx xxx xxxxx xx xx xxx xx
\end{acknowledgment}.
```

Acknowledgments and other unnumbered sections have the title centered.

Please use this section to acknowledge all and any kinds of support your research has obtained.

11. References

Authors should provide complete, correct and properly structured references. All data in the reference must be

correct. Please cite the full title of a journal or the full name of a conference, not an abbreviation (e.g., not *IEEE Tran. N. Networks* but *IEEE Transactions on Neural Networks*, not *ACC 2007* but *American Control Conference 2007*).

To prepare the bibliography using Bib_T_EX, the harvard style with the options `dcucite` and `abbr` as well as the `dcu` bibliography style should be used. It is an author–date type of citations and offers the following useful options employed in our publications:

- `\cite{Reference name}` for parenthetical references, i.e., when they constitute extraneous information:
As has been observed (??; ??; ?) ...
- `\citeasnoun{Reference name}` for textual references, i.e., when they constitute a logical part of the sentence:
As observed by ?, ? and ? ...
- `\citeaffixed{Reference name}{affix}` for parenthetical references containing additional introductory elements:
As has been observed (e.g., ?; ?; ?) ...
- `\citeyear{Reference name}` for multiple references to works by the same author:
As observed by Uciński (??; ??; ?) ...

The list of references should be ordered alphabetically according to the first author's last name. Publications by the same author(s) should be listed chronologically starting with the least recent item. Works by the same author(s) published in the same year are differentiated with *a, b*, etc., as in the example above.

12. Biographies

The authors of accepted papers are expected to provide biographical notes, concisely describing their professional standing, achievements and interests.

Biographies are created using the `biography` environment, which supports an optional argument for the inclusion of a photo:

```
\begin{biography}[photo.eps]{Author's Name}
.
.
.
\end{biography}.
```

The photo area is 2.5cm wide and 3cm long. The author's name is a mandatory parameter and it is written in bold face. The biography should consist of one paragraph not longer than 100 words, while photo images should be prepared with 220 dpi resolution, as gray scale EPS files.

If a photo is not available, the `biography` environment without the optional argument should be used as follows:

```
\begin{biography}[] {Author's Name}
.
.
.
\end{biography}.
```

It should be stressed that a biography of each author of the paper is required, preferably with a photo.

13. Appendices

The `appendix` environment is used to start a single appendix:

```
\begin{appendix}{}
The proof of theorem ....xx xxx xxx xxx xx
xxx xxx xxx xxx xxxxx xx xx xxxxx xx xx xxx
\end{appendix}.
```

The authors can introduce more than one appendix section. In this case they should use the `appendices` environment, which uses capital letters as the numbering convention (e.g., **Appendix A**, **Appendix B**, etc.). When the title of the appendix is required, it is placed in the brackets:

```
\begin{appendix}{Title here}
The proof of theorem ....xx xxx xxx xxx xx
xxx xxx xxx xxx xxxxx xx xx xxxxx xx xx xxx
\end{appendix}.
```

Please note that appendices use their own numbering for equations, figures, lemmas, etc., and they are placed after biographies.

14. Paper notices

The paper notices section includes information about the following:

- Date of paper submission, declared with the `\Received{}` command,
- Date of paper revision, declared with the `\Revised{}` command,
- Date of paper second revision, declared with the `\Rerevised{}` command.

These commands are used solely by the editorial staff, so the authors are asked to ignore them.

Acknowledgment

The authors wish to thank ... xxx xx xx xxx xxx xxx xxx
xxx xx xxx xxx xxx xxx xxx xxx xx xxx xxx xxx xx
xxxx xxx xxx xxx xxx xxx xx.

Author without a photo. Place a brief biography here xxx xxx xxxxx
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The convergence of the algorithm ... xx xx xxx xxx xxx
xxx xxxxx xx xx xxxxx xx xx xxx xx xxx xxx xxx xx xx
xxx xxx xxx xxx xxxxxx xx xx xxxxx xx xx xxx.

$$b = m + n \quad (\text{A2})$$

**Theorem A1.**

Table A1. Appendix table

Algorithm	Performance [%]	Calc. time [s]
gradient	95	100
stochastic	97	80
evolutionary	99	500

Lemma A3.

This is another appendix.

$$c = z + l \quad (\text{B1})$$

Lemma B1. (Equivalence) *Let us begin by ...*

Received: