

UDC 001.816:655.253.3

DOI 10.17223/20710410/XX/1

**INSTRUCTIONS AND RECOMMENDATIONS FOR AUTHORS
TO PREPARE PAPERS IN ENGLISH
FOR “APPLIED DISCRETE MATHEMATICS” JOURNAL**

D. A. Stephantsov, T. V. Butuzova

Tomsk State University, Tomsk, Russia

E-mail: dastephantsov@mail.tsu.ru, tbutuzova@mail.ru

The document contains instructions for authors preparing papers in English for the “Applied Discrete Mathematics” journal with L^AT_EX typesetting system and special style file `admS.sty` created for this purpose.

Keywords: *L^AT_EX, formula, algorithm, table, figure, listing.*

The style file `admS.sty` is based on special style file `mmro.sty` created by K. V. Vorontsov to typeset conference proceedings of All Russian conference “Mathematical Methods for Image Recognition” [1].

1. The paper structure

The text of the paper begins with the lines from the Listing 1. The `\usepackage` command includes style file `admS.sty` which should be placed in the same directory where the paper file is.

```
1 \documentclass[a4paper,twoside,12pt]{article}
2 \usepackage{admS}
3 \begin{document}
```

Listing 1. The paper beginning

The sample how to create a paper header is given in Listing 2. All commands are required. Optional first argument of the `\title` command specifies a short title for a page header. The second argument is a full title with elements of text formatting. The third argument is a full title without formatting, the forth argument is the full title in Russian. Optional argument of the `\author` command specifies a short list of authors for a page header, the second argument is a full list of authors where initials are placed before surnames, the third argument is a full list of authors where initials are placed after surnames, the forth argument is the same as the third and the fifth argument is the full list of authors in Russian. If the first optional argument is missed, then the `\title` command takes a corresponding line for page headers from the third argument, and the `\author` command takes it from the second argument.

To make reference to grants or projects which support the research, it is necessary to place the `\protect\footnotemark` command at the end of the second argument of the `\title` command, and a reference text is the only argument of the `\footnotetext` command in the paper after the `\makeetitle` command. The `\footnote` command should not be used in this case, since the second argument of the `\title` command including the reference text will be typed in capital letters.

The `\organization`, `\email`, and `\udc` commands specify authors affiliations, emails, and universal decimal classification number correspondingly.

```

1 \title[Short paper title]%
2     {Full paper title with formatting}%
3     {Full paper title without formatting}%
4     {Название статьи на русском языке}
5 \author[Short list of the authors, initials at the begin]%
6     {List of the authors, initials at the begin}%
7     {List of the authors, initials at the end}%
8     {List of the authors, initials at the end}%
9     {Список авторов на русском языке}
10 \organization{Organization, City, Country}
11     {Organization, City, Country}
12 \email{email}
13 \udc{XXX.XX \protect\hfill
14 DOI 10.17223/20710410/XX/\thePaperNo}
15 \makeetitle

```

Listing 2. The sample for paper header

Then appear abstracts and lists of keywords in English and in Russian (Listing 3). There should not be empty lines in the abstract and between the abstract text and a list of keywords as well.

```

1 \enabstract{Text of abstract.
2 \protect\enkeywords{list of keywords.}}
3
4 \begin{abstract}
5 Текст аннотации на русском языке.
6 \keywords{список ключевых слов на русском языке.}
7 \end{abstract}

```

Listing 3. The sample for abstracts

The paper text is divided into sections by the `\section` command with the only argument — section title. The `\section*` form of this command allows to create a section without number, it is recommended for introduction and conclusion sections. Section text is divided into subsections by the `\subsection` command. Also it is possible to create paragraphs by the `\paragraph` command.

Bibliography is placed after the paper text in the `theenbibliography` environment. Sources included into bibliography should appear in the order they were cited in the text. In Bibliography every item begins with the `\bibitem{label_name}` command. `Label_name` allows to make reference to the item of the text by the `\cite{label_name}` command. It is possible to use several labels separated by commas: `\cite{label1, label2}`. These label names are valid within the paper. Authors names are created by the `\BibAuthor` command, titles by the `\BibTitle` command, references to the Internet resources by the `\BibUrl` command. For Russian sources, the transliteration should be given in BGN format. After the title is transliterated, it is translated into English. Translation is given in square brackets. The sample for bibliography can be seen in Listing 4.

```

1 \begin{theenbibliography}{1}
2   \bibitem{bibBook1}

```

```

3      \BibAuthor{Author\;N.\,S.}
4          Title.
5          City, Publishing house, 2009. 314\,p.
6  \bibitem{bibArticle1}
7      \BibAuthor{Author1\;N.\,S. and Author2\;N.\,S.}
8      \BibTitle{Nazvanie (translit) [Title (translation)]}
9          Journal Title, 2009, vol.\,38, no.\,5, pp.\,54--62.
          (in Russian)
10  \bibitem{bibUrl1}
11      \BibUrl{www.site.ru} "--- Title, 2009.
12 \end{thebibliography}

```

Listing 4. The bibliography sample

Authors affiliation is given at the end of the paper. Examples appear in Listing 5. Authors' surnames are written in capital letters.

```

1  \begin{authors}
2      \item{SURNAME1 Name Father's_Name}{degree, position,
          company/organization, city}{author1@site.com}
3      \item{SURNAME2 Name Father's_Name}{degree, position,
          company/organization, city}{author2@site.com}
4  \end{authors}

```

Listing 5. Sample of creating authors affiliation

The paper text ends with the `\end{document}` command.

2. The use of standard L^AT_EX tools

To prepare a paper for publishing in “Applied Discrete Mathematics” journal with `admS.sty` file, all basic L^AT_EX tools can be used to create formulas, tables, figures, lists, references, etc. All names (in `\label`, `\command`, `\newcommand`, `\bibitem`, etc. commands) are valid only in the paper and will not cause any conflict with identical names in other authors' papers.

The following packages: `inputenc`, `babel`, `amssymb`, `amsmath`, `mathrsfs`, `euscript`, `array`, `theorem`, `algorithm`, `algorithmic`, `listings`, `bp-diagram`, `xy`, `graphicx`, `color`, `url`, `ifthen` are included into the `admS.sty` file. These packages can be used without the `\usepackage` command.

It is recommended to use `admS.sty` tools. If it is necessary to change the style of any element, it is desirable to explain it in comment.

2.1. Formulas creating

All formulas in the text are enclosed by the symbol “\$”. For example, the function $\phi(pq) = (p - 1)(q - 1)$, number $2\{, \}71$, variable x . Centered formulas without numbers are enclosed either by the symbols “[” and “]” or by the pair of “\$\$” symbols. Numbered formulas are enclosed by the commands `\begin{equation}` and `\end{equation}`. The command `\label{name}` specifies a label name. With this name it is possible to refer to the formula by the command `\eqref{name}`. For example, the command `\eqref{formula}` creates a reference to the formula (1). The commands to create formula (1) are given in Listing 6. The environment `cases` is used to build a multi-line construction. The symbol “&”

aligns the text which appears after it vertically, and the symbols “\” separate lines. In formulas, text is written by the command `\text`.

```

1 \begin{equation}
2   \label{formula}
3   n! =
4   \begin{cases}
5     n (n - 1)!, & \text{if } n > 0; \\
6     1, & \text{if } n = 0.
7   \end{cases}
8 \end{equation}

```

Listing 6. Centered formula with number

The result of Listing 6 translation is the following:

$$n! = \begin{cases} n(n-1)!, & \text{if } n > 0; \\ 1, & \text{if } n = 0. \end{cases} \quad (1)$$

The environments `align`, `gather`, `multline`, and `split` are recommended to use for partitioning long formulas into several lines. The following formula is the example of `align*` environment use:

$$b = \bigoplus_{i=0}^{n-1} a_i x_{k+i},$$

$$x_{m+n} = x_m \left(\bigoplus_{i=1}^{n-1} x_{m+i} \right).$$

This formula is the result of the Listing 7 translation. The `\left` and `\right` commands are used to make the height of brackets the same as the height of subformula enclosed by these brackets.

```

1 \begin{align*}
2   \label{eqalign}
3   b &= \textstyle\bigoplus\limits_{i=0}^{n-1}\{a_i \ x_{k+i}\}, \\
4   x_{m+n} &= x_m \left(\textstyle\bigoplus\limits_{i=1}^{n-1}\{x_{m+i}\}\right). \\
5 \end{align*}

```

Listing 7. The example of `align*` environment use

2.2. Figure creating

Figures should be created by the vector graphics editors and then stored in SVG or EPS formats, because scaling does not change vector graphics quality. When EPS files are created or SVG is converted into EPS, the fonts used must be included in the file. If it is impossible to create a vector figure (e.g. to insert a photo), then bitmap formats BMP, PNG or JPG can be used.

In Listing 8 you will find commands used to include Figure 1 in the paper.

```

1 \begin{figure}[ht]
2 \centering
3 \includegraphics[scale=0.25]{isc.pdf}
4
5 {\small Figure~1. Department of Information Security and
   Cryptography logo}
6 \end{figure}

```

Listing 8. The example of figure creating

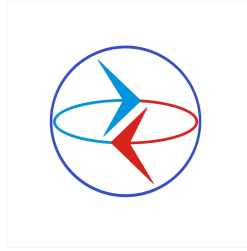


Figure 1. Department of Information Security and Cryptography logo

The `\centering` command is used to place the figure in the center (horizontal). The optional parameter `ht` specifies a figure place on the page (in the example, it is placed either in the middle of the text or at the beginning of the page). The caption of the figure should be placed after it.

Graphs are created by \LaTeX standard packets tools. Data to create a graph is set in `network` environment. The `\nnNode` command sets vertex caption and vertex coordinates, and the `\nnLink` command links two vertices. The outlooks of vertices and links are set by the `xy` packet tools. For mathematical formulas to be used in arcs and vertices titles, the `network` environment is placed in the formula by the brackets “`\[`” and “`\]`”. For the graph to be created as a figure, it should be placed in `figure` environment. In Listing 9, the example how to create a graph in Figure 2 is given.

```

1 \begin{figure}[H]
2 \centering
3 \[
4   \begin{network}
5     \nnNode"a1"( 0, 10)    {+[o][F]{a_1}}
6     \nnNode"a2"( 0,  5)    {+[o][F]{a_2}}
7     \nnNode"a3"( 0,  0)    {+[o][F]{a_3}}
8     \nnNode"b1"(10, 10)    {+[o][F]{b_1}}
9     \nnNode"b2"(10,  5)    {+[o][F]{b_2}}
10    \nnNode"b3"(10,  0)    {+[o][F]{b_3}}
11    \nnLink"a1,b1"         {@{-}}
12    \nnLink"a1,b2"         {@{-}}
13    \nnLink"a1,b3"         {@{-}}
14    \nnLink"a2,b1"         {@{-}}
15    \nnLink"a2,b2"         {@{-}}
16    \nnLink"a2,b3"         {@{-}}
17    \nnLink"a3,b1"         {@{-}}
18    \nnLink"a3,b2"         {@{-}}
19    \nnLink"a3,b3"         {@{-}}

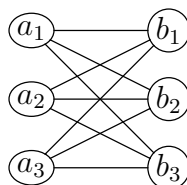
```

```

20      \end{network}
21  \]
22  {\small Figure~2. Graph  $K_{3,3}$ }
23  \end{figure}

```

Listing 9. The example of graph creating

Figure 2. Graph $K_{3,3}$

2.3. Tables creating

Tables are created by the `table` environment. The `tabular` environment used to create table data is placed in the `table` environment. Table caption should appear above the table. In Listing 10 you will find the example of creating a table.

```

1  \begin{table}[ht]
2  \centering\footnotesize
3  \so{Table~1}
4
5  \textbf{{Table caption} }
6
7  \medskip
8  \begin{tabular}{| c | c | c | }
9      \hline
10     One & Two & Three \\
11     \hline
12     Four & Fifth & Six \\
13     \hline
14     Seven & Eight & Nine \\
15     \hline
16 \end{tabular}
17 \end{table}

```

Listing 10. The example of creating Table 1

Table 1
Table caption

One	Two	Three
Four	Fifth	Six
Seven	Eight	Nine

2.4. Programs presentation

Fragments of programs can appear in the `verbatim` environment, which is placed in the `figure` environment. It allows to use the `\label` command to create labels and the `\caption` command to create signatures. Caption appears under the text of the program. It is desirable to use `listings` package tools. This packet is included in `admS.sty` file. Listing 11 presents the example of the program text written in Python.

```

1 \lstset{float=ht,
2     caption={}, label={pyprog}}
3 \begin{lstlisting}
4 from re import *
5
6 if __name__ == '__main__':
7     pat = compile('[0-9]+')
8     print search(pat, 'In a year 2009...').group()
9 \end{lstlisting}
10 \begin{center}
11 \small Listing~12. Python program
12 \end{center}

```

Listing 11. The example of creating program fragment

The `float` parameter of the `\lstset` command sets the listing placement in the paper text. References to lines can be created with brackets “(*@” “@*)” and the `\label` command. In the given example reference to line 4 can be created by the `\ref{compiling}` command. As a result, Listing 12 is created.

```

1 from re import *
2
3 if __name__ == '__main__':
4     pat = compile('[0-9]+')
5     print search(pat, 'In a year 2009...').group()

```

Listing 12. Python program

It is not recommended to change the values of `numbers`, `frame`, `breaklines`, `captionpos`, `columns`, `flexiblecolumns`, `keepspaces`, `basewidth`, `fontadjust`, `basicstyle`, `xleftmargin`, `xrightmargin`, `aboveskip`, `belowskip` parameters by the `\lstset` command. Their values are defined in the file `admS.sty`.

3. Mathematical notations

In style file, new commands were defined and some standard commands were redefined to create formulas and the environments of the theorem type.

To denote the sets of numbers \mathbb{N} , \mathbb{Z} , \mathbb{R} , the `\NN`, `\ZZ` and `\RR` commands are used correspondingly. Mathematical operators `\argmin`, `\argmax`, `\diag`, `\sign`, `\Tr`, `\const` are defined and mathematical operators `\lim`, `\inf`, `\sup`, `\max`, `\min` are redefined so that limits are placed under them but not next to. Mathematical operators without limits and with limits, which are placed under operators, can be created by the `\mylim` and `\myop` commands.

To write vector and matrix values, the `\vec{formula}` command can be used. To write formulas of probability theory of, such commands as `\Prob` (probability), `\Expect` (mathematical expectation), `\Var` (dispersion), `\Normal` (normal distribution) are used. In conditional probability vertical bar is created by the `\cond` command.

There exist the following environments for the theorem type sentences: `theorem`, `lemma`, `proposition`, `corollary`, `definition`, `example`, `remark`, `proof`. The theorem proof ends automatically with the symbol `\qed`. The example of environments is provided below.

Proposition 1. Proposition text.

Definition 1. Definition text.

Theorem 1. Theorem texe.

Corollary 1. Corollary text.

Corollary 2. Other corollary text.

Lemma 1. Lemma text.

Proof. Proof of lemma 1. ■

Corollary 3. Corollary of lemma 1.

Lemma 2. Other lemma text.

Theorem 2 (title or author's name). Theorem text.

Proof. Proof of theorem 2. ■

Example 1. Example text.

This text is obtained by compiling Listing 13.

```

1 \begin{proposition}
2 Proposition text.
3 \end{proposition}
4 \begin{definition}
5 Definition text.
6 \end{definition}
7 \begin{theorem}
8 Theorem texe.
9 \end{theorem}
10 \begin{corollary}
11 Corollary text.
12 \end{corollary}
13 \begin{corollary}
14 Other corollary text.
15 \end{corollary}
16 \begin{lemma}
17 \label{lemma1}
18 Lemma text.
19 \end{lemma}
20 \begin{proof}
21 Proof of lemma~\ref{lemma1}.
22 \end{proof}
23 \begin{corollary}
24 Corollary of lemma~\ref{lemma1}.
25 \end{corollary}
26 \begin{lemma}

```



```

27 Other lemma text.
28 \end{lemma}
29 \begin{theorem}[(title or author's name)]
30 \label{theorem1}
31 Theorem text.
32 \end{theorem}
33 \begin{proof}
34 Proof of theorem~\ref{theorem1}.
35 \end{proof}
36 \begin{example}
37 Example text.
38 \end{example}

```

Listing 13. The example of how to use the theorem type environments

4. Typing guidelines

To publish a paper in the “Applied Discrete Mathematics” journal, it is necessary to type texts by using L^AT_EX system and observe common rules.

The double quotation mark characters “ and ” are used in the text, for example the “Applied Discrete Mathematics” journal.

Punctuation marks (full stop, comma, and so on) are typed in one word with the previous text, and are separated by a white space from the following text. Brackets and the text (which is enclosed by these brackets) are written in one word. Dash is created by the “---” command. Dash is separated from the previous and following text by a white space. The range of numbers is created by the command --, for example “P. 50–64”. Non-breaking space ~ is used to not transfer short words and formulas at the end of the paragraph onto a new line, and to not separate prepositions from the words they follow. A short non-breaking space \, is used in initials.

Lists are created in the following way:

- 1) number is followed by a bracket;
- 2) items end with a semicolon;
- 3) final item ends with a point.

For this purpose, the environment `enumerate*` is suitable.

5. Preparation of papers in coding other than cp1251

To typeset the “Applied Discrete Mathematics” journal, cp1251 encoding is used. To typeset a paper in other encoding, for example koi8-r, it is necessary:

- 1) to encode file `admS.sty` from encoding cp1251 into the required encoding;
- 2) to change the `\RequirePackage[cp1251]{inputenc}` parameter in `admS.sty` file from encoding cp1251 to the required encoding title.

REFERENCES

1. <http://www.ccas.ru/voron/latex.html>. 2007.