

How to Use the L^AT_EX 2_ε Class File (`ieej-etec.cls`) for the Papers of Technical Meeting of IEEJ

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Abstract

IEE Japan (the Institute of Electrical Engineers of Japan) provides a L^AT_EX 2_ε class file, named `ieej-etec.cls` for the Papers of Technical Meeting. This document describes how to use the class file, and also makes some remarks about typesetting a document by using L^AT_EX 2_ε. The design is based on L^AT_EX 2_ε.

Key words: class file, L^AT_EX 2_ε

1. Introduction

This document describes how to handle the class file (`ieej-etec.cls`) for the Papers of Technical Meeting of the Institute of Electrical Engineers of Japan. Section 2 explains how to typeset a paper according to the template. Section 3 offers appropriate parameters when using dvips. Section 4 describes special features of `ieej-etec.cls`. Section 5 is concerned with typographic notes, which explains how to typeset, how to prevent typographic errors and how to handle long formulas, etc.

2. Template and How to Typeset

Here is the template of the paper.

```
\documentclass{ieej-etec}

\begin{document}
\PaperNo{}
\title{title}
\authorlist{%
  \authoreentry{name}{label}
}
\affiliate[label]{affiliate}
\begin{abstract}
Summary
\end{abstract}
\begin{keyword}
Keywords
\end{keyword}
\maketitle
\section{Introduction}
...
\begin{thebibliography}{99}
\bibitem{}
...
\end{thebibliography}
\appendix
\section{}
...
\acknowledgment
...
```

```
\end{document}
```

- The Paper number must be specified in `\PaperNo`.
- The title of a paper is assigned in `\title`. You might use `\\` to start a new line in a long title.
- The output of authors' names and affiliates are generated by the `\authorlist` and `\authoreentry` commands.

The `\authoreentry` command must be described as an argument of the `\authorlist` command. The `\authoreentry` command has two arguments.

```
\authoreentry{name}{label}
```

For example, they could be typesetted as follows:

```
\authorlist{%
\authoreentry*{Taro_Denshi}{TRL}
\authoreentry{Hanako_Denki}{KEC}
}
```

The entry of a presenter must be added `*` to `\authoreentry` command, if there are two or more authors.

- The first argument of `\authoreentry` is filled with the author's name.
- The second argument is assigned by the label of the author's affiliate, corresponding to the label of the `\affiliate` command (see below). For example, an abbreviation for a university, institute or company can be given.
- An author's affiliate is described in the `\affiliate` command as follows.

```
\affiliate[label]{affiliate}
```

The first argument "*label*" must be the same as the 2nd argument of the `\authoreentry` command. The second argument is assigned by an author's affiliate.

No extra spaces must be added between a letter and a brace in the first argument (*label*). The entry of `\affiliate` must be followed by the order of labels in `\authorlist` commands.

- If the labels of `\affiliate` are different from those of `\authoreentry`, there will be a warning message on your terminal.
- In case there are many authors and long names of affiliates, breaking line is done by using `\breakauthorline` command and `\break` command. For example,

`\breakauthorline{3}` causes the line to break after the third author's name.

`\break` command is recommended to break line in the second argument of `\affiliate`.

- The text of the abstract is described in the `abstract` environment. The text should be a maximum of 50 to 100 words.

The text of the keywords is described in the `keyword` environment. The text should be a one line spread.

- The `\maketitle` command must come after those commands before the main text begins.
- The `\appendix` command of the standard L^AT_EX 2_ε is a declaration that changes the way sectional units are numbered. But `\appendix` of the class file generates the heading "Appendix", and appendix sections are numbered "1", "2", etc., while appendix equation numbers are numbered "(A1)", "(A2)", etc., and appendix figure numbers are numbered "app. Fig. 1", "app. Fig. 2".
- The `\acknowledgment` command is available if you want to express your gratitude.

3. Printing on A4 paper and making pdf file

- If you print a manuscript on A4 paper by using dvips, the following parameter might be set.

```
dvips -t a4 -O 0mm,0mm readme.dvi
```

- You can directly make a pdf file by using pdflatex, or convert a dvi file to a pdf file by using dvips and Acrobat Distiller or dvi2pdfm.

- If you convert a dvi file to a pdf file, you must first convert a dvi file to a ps file:

```
dvips -t a4 -O 0mm,0mm -o readme.ps
readme.dvi
```

then, convert a ps file to pdf file by using Acrobat Distiller.

Otherwise, you may convert a dvi file to a pdf file by using dvi2pdfm.

```
dvi2pdfm -p a4 -x 1in -y 1in -o readme.pdf
readme.dvi
```

4. Special Feature of ieej-etec.cls

4.1 Formula `dotseqn.sty` is embeded in this class file in order to fill a space between a formula and a formula number with dots.

A displayed formula is aligned on the left, a fixed distance (6.5 mm) from the left margin, instead of being centered. A formula number is put on the right side, 3.25 mm from the right margin, in the `equation` and `eqnarray` environments.

The following is an example of a displayed formula. If you type below:

```
\begin{eqnarray}
\lefteqn{\int\!\!\!\int\!\!\!\int_S}
\left(\frac{\partial V}{\partial x} - \frac{\partial U}{\partial y}\right)
dx dy \quad \quad \quad \nonumber \\
&= \oint_C \left( U \frac{dx}{ds} + V \frac{dy}{ds} \right) ds
\end{eqnarray}
```

Then, you get the following:

$$\iint_S \left(\frac{\partial V}{\partial x} - \frac{\partial U}{\partial y} \right) dx dy$$

$$= \oint_C \left(U \frac{dx}{ds} + V \frac{dy}{ds} \right) ds \dots\dots\dots (1)$$

A width of one column is too narrow to compose displayed formulas. Therefore, you should compose equations with the proper length, paying attention to the message "Overfull \hbox".

4.2 Theorem-like Environment

If you use the `\newtheorem` environment, pay attention to the following points. There are no additional vertical spaces before and after the environment, and the text within the environment does not appear in italics.

An example is given as follows:

```
\newtheorem{theorem}{Theorem}
\begin{theorem}
There are no positive integers such that
 $x^n + y^n = z^n$  for  $n > 2$ .
I've found a remarkable proof of this fact,
but there is not enough space
in the margin [of the book] to write it.
(Fermat's last theorem).
\end{theorem}
```

Then, you get the following:

Theorem 1 There are no positive integers such that $x^n + y^n = z^n$ for $n > 2$. I've found a remarkable proof of this fact, but there is not enough space in the margin [of the book] to write it. (Fermat's last theorem).

4.3 Footnotes

The footnote begins with "†" (see page 4). As the footnote counter increases, the footnote marks proceed as "†", "††", "†††". The footnote mark is set to reset at each page.

4.4 Figures and Tables

The font size inside the `figure` and `table` environments is set `\footnotesize` (7 pt).

The `[h]` option, one of the arguments of floating environment specifying a location where the float may be placed, is not recommended. Figures and tables should be located at the top or bottom of a page by using `[tb]` etc. for the papers of technical meeting of IEEEJ.

4.4.1 Including Graphics

Although there are many ways to include pictures and figures in L^AT_EX, the Encapsulated POSTSCRIPT format (EPS) is recommended.

Here is a simple explanation to insert graphics into the text:

The `graphics` or `graphicx` package must be loaded. `dvips` is one device driver's option and it might be changed according to which device driver you use, or it may be omitted.

```
\usepackage[dvips]{graphicx}
```

A graphics file (EPS file) produced by another program can be included with the `\includegraphics` command.

```
\begin{figure}[tb]
\begin{center}
\includegraphics{file.eps}
\end{center}
\caption{...}
\label{fig:1}
\end{figure}
```

If the option `scale=0.5` is given, the graphics will be scaled by half.

```
\includegraphics[scale=0.5]{file.eps}
```

You can get the same result as above by using the `\scalebox` command.

```

\begin{figure}[tbp]
... floating materials ...
\capwidth=50mm
\caption{An example of caption
in English.}
\label{fig:1}
\end{figure}

```

Fig. 1. An example of caption in English.

Table 1. An example of table caption in English.

A	B	C
X	Y	Z

```

\begin{table}[b][tbp]
\caption{An example of table caption in English.}
\label{table:1}
\begin{center}
\begin{tabular}{c|c|c}
\hline
A & B & C\\
\hline
X & Y & Z\\
\hline
\end{tabular}
\end{center}
\end{table}

```

`\scalebox{0.5}{\includegraphics{file.eps}}`

If the option `width=30mm` is given, the width of graphics will be 30 mm (with the height proportionally scaled).

`\includegraphics[width=30mm]{file.eps}`

The next is another example using `\resizebox`.

`\resizebox{30mm}{!}`

`{\includegraphics{file.eps}}`

Both dimension of width and height can be specified as follows.

`\includegraphics[width=30mm,height=40mm]{file.eps}`

or

`\resizebox{30mm}{40mm}`

`{\includegraphics{file.eps}}`

For further information about the graphics package, see reference book (10) (12).

4.4.2 Captions of Floating Environment

The class file set the width of caption 72 mm (single column) and `0.8\textwidth` (double column). The width of caption can be set by changing the value of `\capwidth` (see Fig. 1)

4.5 Verbatim Environment

You can change the values of the parameters in the verbatim environment which is customized for the class file. The default settings are:

`\verbatimleftmargin=0pt`

`\def\verbatimsize{\normalsize}`

`\verbatimbaselineskip=\baselineskip`

The left margin of the verbatim environment is set 0pt. The font size is set `\normalsize`. The baselineskip is set the same of normal texts.

For example, those parameters can be changed as follows:

`\verbatimleftmargin=6.5mm`

`\def\verbatimsize{\footnotesize}`

`\verbatimbaselineskip=3mm`

Table 2. `\FRAC` and `\RN`

<code>\RN{2}</code>	II
<code>\RN{117}</code>	CXVII
<code>\FRAC{\pi}{2}</code>	$\pi/2$
<code>\FRAC{1}{4}</code>	$1/4$

4.6 Bibliography and Citations `citesort.sty`

is embedded, which is somewhat customized. The `citesort.sty` collapses a list of three or more consecutive numbers into a range, and sorts the numbers before collapsing them. For example, “(6) (8) (5) (2) (1) (3)” is transformed into “(1)–(3) (5) (6) (8)”.

The `\cite` command displays citations as superscript numbers. To get “ref. (1)”, the `\Cite` command can be used.

In the `thebibliography` environment, place references in the right order according to the IEEEJ editing style; e.g., authors’ names, initials, title of article, journal abbreviation, volume number, pages, and publication year. Journals are italicized as `\itshape`, and titles of papers enclosed with “” in plain text.

4.7 Make All Text Pages the Same Height

`\flushbottom` is declared in the class file. It makes all text pages the same height, adding extra vertical space when necessary to fill out the page.

4.8 AMS Packages

The \LaTeX packages are provided to typeset complex equations or other mathematical constructions. If you would like to use them, the `amsmath` package should be loaded with the `fleqn` option.

`\usepackage[fleqn]{amsmath}`

When the `amsmath` package is loaded, many environments, (for example the `equation`, `align`, `gather`, `multiline` and `split` environments, etc.) will not automatically generate dots between a formula and a formula number. One primitive way to resolve this problem is to typeset as follows at the end of the formula:

`\rlap{\hbox to 10mm{\ \EqnDots}}`

This puts the leaders of width 10mm into a box of width zero, extending to the right of the current position.

While the `amsmath` package presents many functions, only the `\boldsymbol` command which is to be used for individual bold math symbols and bold Greek letters is needed, only the `amsbsy` package should be loaded.

`\usepackage{amsbsy}`

When the `amssymb` package is loaded, many extra math symbols of the \LaTeX fonts will become available⁽¹¹⁾.

`\usepackage[psamsfonts]{amssymb}`

4.9 Miscellaneous

4.9.1 Macros Defined by `ieej-etec.cls`

- `\QED`: Produces “□” in the end of the proof and so on. You would get the same output by using `\hfill \Box`. But if the end of a paragraph goes to the right margin, the character □ is positioned at the start of a line. Using `\QED` will prevent such cases.
- `\halflineskip` and `\onelineskip`: Produce a vertical space, $1/2\text{baselineskip}$, 1baselineskip respectively.
- As shown in Table 2, the macros `\RN` and `\FRAC` are defined⁽¹⁾.

5. Typographic Notes

5.1 How to Prevent Typographic Errors

- (1) You should be sure how T_EX handles a period. The following sentences are citations from (10).

“T_EX simply assumes that a period ends a sentence unless it follows an uppercase letter. This works most of the time, but not always—abbreviations like ‘etc.’ being the most common exception. You tell T_EX that a period doesn’t end a sentence by using a `_` command (a `\` character followed by a space or the end of a line) to make the space after the period.”

“On the rare occasions that a sentence-ending period follows an uppercase letter, you will have to tell T_EX that the period ends the sentence. You do this by preceding the period with a `\@` command.”

Beans (lima, etc.)\ have vitamin B\@.

- (2) “Line breaking should be prevented at certain interword spaces. ... Trying `~` (a tilde character) produces an ordinary interword space at which T_EX will never break a line.”⁽¹⁰⁾

Mr.~Jones, Figure~\ref{fig:1}, (1)~gnats.

- (3) With respect to Figure, Section, Equation, when these words appear at the beginning of a sentence, they should be spelt out in full, e.g., “Figure 1 shows...” is used. When they appear in the middle of a sentence, abbreviations, e.g., “in Fig. 1”, “in Sect. 2”, “in Eq. 3” should be used.

- (4) There should be no space after opening or before closing parentheses, as in `(\word)`.

- (5) There are many cases of an inappropriate application of a `\` or `\newline` command (except in the tabular environment), such as two `\` commands in succession or `\` command just before a blank line. They will often cause warning messages like `Underfull \hbox ...`. As a result, it would often prevent you from finding important warning messages. The use of `\par\noindent` or `\hfil\break` commands is recommended and gives you the same effect without warning messages.

- (6) There are some cases of an inappropriate application of a `\` in descriptions such as program lists. Use of the `\tabbing` environment or `\list` environment is recommended.

- (7) The difference in the use of the hyphen (-), en dash (--) and em dash (---) should be noted. A hyphen is used in connecting English-language words such as ‘well-known’, and an en dash is used when expressing a range such as ‘pp.298–301’. The em dash is even longer—it is used as punctuation.

- (8) The difference when hyphen and en dash are used in maths mode should also be noted. Some examples are given below.

`$A^{\mathrm{b}}\mathrm{c}\Rightarrow$`

$A^{b-c} \Rightarrow$ hyphen

`$A^{\mathrm{b}}\mathrm{c}\Rightarrow$`

$A^{b-c} \Rightarrow$ en dash

`$A^{\mathrm{b-c}}$`

$A^{b-c} \Rightarrow$ minus sign

- (9) The less-than sign “<” (<, a relation) should not be confused with “\” (`\angle`, a delimiter). The same is

true for the greater-than sign “>” and “\”.

- (10) A unary operator and a binary operator: “A + or – that begins a formula (or certain subformulas) is assumed to be a unary operator, so typing `$-x$` produces $-x$ and typing `$\sum -x_i$` produces $\sum -x_i$, with no space between the “–” and “x”. If the formula is part of a larger one that is being split across lines, T_EX must be told that the + or – is a binary operator. This is done by starting the formula with an invisible first term, produced by an `\mbox` command with a null argument.”⁽¹⁰⁾

```
\begin{eqnarray}
y &=& a + b + c + \dots + e \\
&& & \& \mbox{} + f + \dots
\end{eqnarray}
```

- (11) `\allowbreak` may be used within long maths formulas in paragraphs instead of using `\`, `\hfil\break` or `\linebreak`, since T_EX is reluctant to break lines there.

5.2 How to Handle Long Formulas

Here are some explanations on how to handle long formulas, for example, overhanged equations, equations overriding the equation number, and so forth.

Example 1:

$$y = a + b + c + d + e + f + g + h + i + j + k + l + m(2)$$

The equation is too long, and the space between the equation and the equation number are too narrow. Also, sometimes the equation number moves to the right. In this case the `\!` command is useful.

“The `\!` acts like a backspace, removing the same space amount of space that `\`, adds.”⁽¹⁰⁾

```
\begin{equation}
y\!=\!a\!+\!b\!+\!c\!+\!d\!+\!e\!+\!f\!+\!g\!+\!h\!+\!i\!+\!j\!+\!k\!+\!l\!+\!m
\end{equation}
```

$$y = a + b + c + d + e + f + g + h + i + j + k + l + m \dots\dots\dots (3)$$

Example 2: Using `eqnarray` environment instead of `equation` environment.

```
\begin{eqnarray}
y &=& a+b+c+d+e+f+g+h\mathrm{nonnumber} \\
&& & \& \mbox{}+i+j+k+l+m+n+o
\end{eqnarray}
```

To typeset above, you will get the following output.

$$y = a + b + c + d + e + f + g + h + i + j + k + l + m + n + o \dots\dots\dots (4)$$

Example 3: To change the value of `\mathindent` is to change the position that the equation begins[†].

```
\mathindent=0mm % <-- [1]
\begin{equation}
y=a+b+c+d+e+f+g+h+i+j+k+l+m
\end{equation}
\mathindent=6.5mm % <-- [2] default value
```

[†] This explanation is appropriate to left-aligns displayed formulas, not to centering formulas.

To typeset above (see [1]), you will get the following output.

$$y = a + b + c + d + e + f + g + h + i + j + k + l + m \quad (5)$$

The value of `\mathindent` must be restored (see [2]).

Example 4:

$$\iint_S \left(\frac{\partial V}{\partial x} - \frac{\partial U}{\partial y} \right) dx dy = \oint_C \left(U \frac{dx}{ds} + V \frac{dy}{ds} \right) ds. \quad (6)$$

The equation is too long and overrides the equation number. In this case the `\lefteqn` command is useful. It can be used for splitting long formulas across lines as follows:

```
\begin{equation}
\lefteqn{
\int\!\!\int_S \left( \frac{\partial V}{\partial x} - \frac{\partial U}{\partial y} \right) dx dy
= \oint_C \left( U \frac{dx}{ds} + V \frac{dy}{ds} \right) ds
}
\end{equation}
```

To typeset above, you will get the following output:

$$\iint_S \left(\frac{\partial V}{\partial x} - \frac{\partial U}{\partial y} \right) dx dy = \oint_C \left(U \frac{dx}{ds} + V \frac{dy}{ds} \right) ds \dots\dots\dots (7)$$

Example 5: A matrix using the `array` environment.

$$A = \begin{pmatrix} a_{11} & a_{12} & \dots & a_{1n} \\ a_{21} & a_{22} & \dots & a_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{m1} & a_{m2} & \dots & a_{mn} \end{pmatrix} \dots\dots\dots (8)$$

The width of a matrix can be shrunk by changing the value of `\arraycolsep` or using an `@`-expression (`@{}`).

```
\begin{equation}
\arraycolsep=3pt % <--- [1]
A = \left(
\begin{array}{@{\hskip2pt}% <--- [2]
cccc
@{\hskip2pt}% <--- [2]
}
a_{11} & a_{12} & \ldots & a_{1n} \\
a_{21} & a_{22} & \ldots & a_{2n} \\
\vdots & \vdots & \ddots & \vdots \\
a_{m1} & a_{m2} & \ldots & a_{mn}
\end{array}
\right)
\end{equation}
```

The `\arraycolsep` dimension is half the width of a horizontal space between columns in the `array` environment. A matrix using the `array` environment can be shrunk by changing the value of `\arraycolsep` (see [1]). And also it can be shrunk by using `@`-expression (see [2]).

$$A = \begin{pmatrix} a_{11} & a_{12} & \dots & a_{1n} \\ a_{21} & a_{22} & \dots & a_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{m1} & a_{m2} & \dots & a_{mn} \end{pmatrix} \dots\dots\dots (9)$$

Compare Eqs. (8) and (9).

Example 6: A matrix using a `\pmatrix`.

```
\begin{equation}
\def\quad{\hskip.75em\relax}% <--- [1]
%% default setting is \hskip1em
A = \pmatrix{
a_{11} & a_{12} & \ldots & a_{1n} \\
a_{21} & a_{22} & \ldots & a_{2n} \\
\vdots & \vdots & \ddots & \vdots \\
a_{m1} & a_{m2} & \ldots & a_{mn}
}
\end{equation}
```

In the case of the equation using `\pmatrix`, the definition of `\quad` can be changed (see [1]).

If `amsmath` packages is loaded, the `pmatrix` environment must be selected instead of `\pmatrix`. In that case, the explanation from Example 5 is useful.

References

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- (14) B.S. Lipkin: `LATEX` for Linux, Springer-Verlag New York (1999)

Appendix

Omitted Commands

Some commands which are not required by the class file are omitted. These commands are `\tableofcontents`, `\titlepage`, `\part`, `\theindex`, `headings`, `myheadings` and the related commands.