The \texttt{aipproc} class v1.2 (8.5 x 11 in version, double column) for $\LaTeX \varepsilon$

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\textbf{Abstract.} This guide describes the functionality and use of the \texttt{aipproc} class by explaining its extensions and restrictions compared to the \texttt{article} class of standard $\LaTeX \varepsilon$. It is not a manual to be used on its own but should be used together with an introductory manual on $\LaTeX \varepsilon$ such as \cite{6}. This version of the guide covers only the features needed to produce camera ready copy for AIP Conference Proceedings 8.5in x 9in double column.

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\begin{tabular}{ll}
\textbf{GENERAL OVERVIEW} & 1 \\
\textbf{The \texttt{aipproc} class is a $\LaTeX \varepsilon$ document class for conference proceedings of the American Institute of Physics and other documents with similar layout requirements. It is intended to produce camera-ready copy for direct photo-offset use. The only modification done by the publisher is adding appropriate page numbers. This version of the guide explains how to use the class when producing camera ready copy for AIP Conference Proceedings 8.5in x 9in double column format.} & \footnote{1 For a complete description of all class features see the file \texttt{aipguide.pdf}.}
\end{tabular}

\textsuperscript{1} For a complete description of all class features see the file \texttt{aipguide.pdf}.

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in the following places before it can be used with the aipproc class (a more detailed description is given in later sections):

- In the preamble, since the aipproc class requires a \layoutstyle declaration.
- In the front matter, since the aipproc class uses an extended set of title/author declarations.
- In the body of floats, since the aipproc class only allows a single \caption command and processes the body in horizontal mode.

**CHECKING YOUR \LaTeX DISTRIBUTION**

To ensure that your installation of \LaTeX contains everything necessary to successfully use the aipproc class, run the file aipcheck.tex through \LaTeX, e.g.,

```
latex aipcheck
```

It will try to determine if everything necessary is available and if not, will make recommendations what can be done about it. In certain cases you might be able to use the class if you follow the suggestions, in other cases the only solution is to upgrade your \LaTeX installation.

**CLASS DETAILS**

**Selecting the target layout**

The class supports different layouts. These are selected by placing a \layoutstyle declaration in the preamble of the document.

```
\layoutstyle{layout name}
```

This command is required. When producing an article for the AIP Conference Proceedings 8.5in x 9in double column format the declaration should be \layoutstyle{8x11double}.

**Supported options**

As the class is based on the article class of standard \LaTeX all reasonable options of this class are supported automatically. In addition there are a number of options unique to the aipproc class.

---

2 Reasonable means not conflicting with fixed requirements for the AIP class, e.g., as this class requires 10pt body size option 11pt and 12pt are ignored and produce a warning.

---

**Paper selection**

Two options control the placement of the text on the physical page. Choose the one that corresponds to your printer paper.

- **letterpaper** Directs the class to assume that the output is printed on US letter sized paper (default).
- **4apaper** Directs the class to assume that the output is printed on A4 sized paper.

**Font selection**

Four options control the selection of fonts in the document; use at most one of them.

- **mathptm** Directs the class to use PostScript Times and Symbol fonts (a few missing glyphs are taken from Computer Modern) for math by loading the mathptm package. This option is the default. This option does not support the \boldmath command since there exists no PostScript Symbol font in bold. It is possible, however to use \mathbf which allows you to get at least a bold Latin Alphabet.
- **mathtime** Directs the class to use MathTime fonts for math by loading the mathtime package. These fonts are commercial so that this option will not work if you don’t own them. If this option is chosen one can also use the options for this package as global options to the class. The most important ones are
  - **uprightgreek** Use upright greek characters instead of slanted ones.
  - **mtbold** Use MathTime Bold characters bold glyphs.
  - **mtpluscal** Use MathTimePlus calligraphic characters for \cal.
  - **mtplusscr** Use MathTimePlus script characters for \cal.
  - **lucidascr** Use Lucida calligraphic characters for \cal.
  - **lucidascr** Use Lucida script characters for \cal.

The last four options require additional commercial fonts, i.e., MathTimePlus or Lucida.

- **nomathfonts** Directs the class not to set up math fonts (which means using the installation default which is usually Computer Modern). This option is intended in case a special math font setup is loaded in the document preamble.

- **cmfonts** Directs the class to use standard Computer Modern fonts for math and text. This does not conform to the specification for this class and is in-
tended for draft preparation in environments where the required fonts are unavailable.

Textual references

The next options enable textual references; if this is desired select one of them:

\textsc{varioref} Loads the varioref package (see \cite[p.41ff]{thebook}) allowing to produce textual page references. See section on Cross-references on the following page for details.

\textsc{nonvarioref} Disables the \texttt{\refextvario} command so that the strings produced by varioref commands will not depend on the number of references seen so far. Implies the varioref option.

Table note markers

Notes to tables can be influenced as follows:

\textsc{tnotealph} Produce raised lower case alphabetic marks to indicate table notes.

\textsc{tnotesymbol} Use footnote symbols to indicate table notes (default).

Drafts

Finally there is one standard article class option which has its functionality extended:

\textsc{draft} Allows \texttt{\tableofcontents} and similar commands to work without error message (during development of article). It marks overfull boxes and also provides page numbers in the printout.

Remove this option when producing the camera ready copy.

Front matter

The class supports an extended set of front matter commands. These commands differ from those used by standard \LaTeX's article class. Thus, if an article already written is adapted to be used with the aipproc class, the front matter has to be modified somewhat.

Some of the commands below are required only for certain proceedings. Declarations that are not required will be silently ignored.

\texttt{\title[short title]{title text}}

In standard \LaTeX this command has no optional argument. In the aipproc class one can specify an abbreviated title text which is used, for example, in the running footer in draft mode.

\texttt{\author{author name}{author information}}

In standard \LaTeX this command had only one argument containing both author name and address information. In this class it has two arguments and the second argument contains data structured using key/value pairs separated by commas.

For example, the authors of this paper have been specified as:

\begin{verbatim}
\author{F. Mittelbach}{
  address={Zedernweg 62, Mainz},
  email={frank.mittelbach@latex-project.org},
}
\author{D. P. Carlisle}{
  address={Willow House, Souldern},
  email={david@dcarlisle.demon.co.uk},
}
\end{verbatim}

Supported keywords for the AIP Conference Proceedings 8.5in x 9in double column are address and email, although the latter will not be printed.

\texttt{\begin{abstract}}

In contrast to standard \LaTeX the abstract environment has to appear before the \texttt{\maketitle} command.

\texttt{\maketitle}

This command inserts the actual front matter data. It has to follow the above declarations.

Multiple authors

Multiple authors are entered by specifying one \texttt{\author} command per author. Care needs to be taken when specifying shared addresses: they have to be absolutely identical. Depending on the chosen layout the class will merge such addresses but will recognize them only as identical, if the input including spaces is the same!

The \texttt{\and} command as defined in the article class to separate multiple authors is not supported.

Dates

The article class provides the \texttt{\date} command which is not used by aipproc class. If supplied it will be ignored.
unless the draft option is specified in which case it will show up in a footer line together with the title and the page number to ease document development.

Other front matter commands

The \tableofcontents, \listoffigures, and \listoftables commands are provided but produce (beside output) an error message unless the draft option was selected. This is done since the aipproc class does not support page numbering and thus the above commands essentially produce incorrect data.

Headings

The aipproc class officially supports three heading levels, i.e., \section, \subsection, and \subsubsection.

It also supports the commands \paragraph and \subparagraph although the latter heading levels are not part of the aipproc class specification and are therefore discouraged.

Cross-references

Cross-references to page numbers are not possible with the aipproc class as the page numbers are determined after production. For this reason the \pageref command of \LaTeX is disabled by default.

Since headings in most layouts do not carry numbers they can’t be referenced either.

References to tables, figures, and equations are possible using the \LaTeX commands \label and \ref. However if the class option varioref or nonvarioref is used, references to page numbers are possible again as they will generate textual references of the form “on the following page” or “on an earlier page” etc. The produced strings are customizable as described in detail in the varioref package documentation or in [4] p.41ff.

The class defaults are as follows and can be changed with \renewcommand in the document preamble. The varioref package normally distinguishes between reference to facing pages and references to pages that need turning over using different strings in these cases. However, since with aipproc class page numbers are not determined at the time of production no assumption can be made that page $x$ and $x+1$ actually fall onto the same double spread. For this reason the defaults used here do not produce strings containing the word “facing” or “opposite”.

\renewcommand\reftextfaceafter {on the next page}
\renewcommand\reftextfacebefore {on the \reftextvario{previous} (preceeding) page}
\renewcommand\reftextafter {on the \reftextvario{next} (following) page}
\renewcommand\reftextbefore {on the \reftextvario{previous page} (page before)}
\renewcommand\reftextcurrent {on \reftextvario{this} (the current page)}

Normally, text for references which are “far away” are produced using \reftextfaraway in varioref. However, to produce textual references without referring to actual page numbers even in this case, this command was hijacked in the aipproc class and redefined to determine whether or not this is a reference to some earlier or later page. So instead of changing this command the class provides the following two commands for customization:

\renewcommand\reftextearlier {\reftextvario{on an earlier page} (earlier on)}
\renewcommand\reftextlater {\reftextvario{later on} (further down)}

To illustrate the result of this package all references in this document are made using \vref or \vpageref, e.g., references to Figure \ref{2} further down and Figure \ref{1} on the following page. These commands work best if used only for important references. Be careful when using them several times close to each other as the automatically generated texts then may sound strange (as they do in the example in this paragraph).

\eqref{label}

For reference to equation numbers \eqref can be used instead of the standard \ref command. The \eqref command will automatically add any frills required by the layout style, while \ref will only typeset the plain number. In the AIP Conference Proceedings 8.5in x 9in double column format it will print “(1)” while \ref would result in “1”.

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Lists

The \texttt{aipproc} class supports all standard list environments like \texttt{itemize}, \texttt{enumerate}, etc.

Graphics support

Support for including and manipulating graphics is provided as the standard \texttt{LATeX} \texttt{graphicx} package is automatically loaded by the \texttt{aipproc} class. For detailed descriptions of the commands made available by this package see \texttt{[5]} or the package documentation coming with the \texttt{LATeX} release. A sufficient introduction is also given by \texttt{[6]} although there only the \texttt{graphics} package (a subset of the \texttt{graphicx} package) is described.

A typical application is given in the following example where a picture is resized to span 70\% of one column:

\begin{figure}[!b]
\resizebox{.7\columnwidth}{!}{\includegraphics{escher}}
\source{Guy Shaw}
\caption{An illustration taken from~\cite{A-W:GMS94}}
\label{fig:a}
\end{figure}

resulting in figure 1.

Floats

Floats are objects which do not have to stay in sync with the running text but are allowed to move from their original place to some other position where they fit better for page breaking reasons. Such objects they are typically numbered so that they can be referenced from within the running text.

\texttt{LATeX} by default supports two float types: figures and tables. These float types are also supported by the \texttt{aipproc} class although their internal implementation is quite different resulting in a number of important differences in behavior:

- The position of the float caption is determined automatically, independently of the placement of the \texttt{\caption} command within the float body.
- Depending on its width the float automatically spans two columns. In case of a table the whole object (including its caption) might be rotated automatically if its exceeds \texttt{\textwidth}.
- The body of the float environments are processed in L-R mode and not in paragraph mode as in standard \texttt{LATeX}. This is necessary for measuring its width. Thus if paragraph mode is needed one has to put a \texttt{minipage} environment of the appropriate width (e.g., \texttt{\textwidth}) into the body.
- Only one \texttt{\caption} command per float is allowed.

\begin{figure}[pos]
\begin{figure}
\resizebox{.8\textwidth}{!}{\includegraphics{outline}}
\caption{PostScript example taken from~\cite{A-W:GMS94}}
\label{fig:b}
\source{F. Mittelbach}
\end{figure}
\caption{An illustration taken from\cite{A-W:GMS94}}
\end{figure}

\begin{figure}[pos]
\begin{figure}
\resizebox{.8\textwidth}{!}{\includegraphics{outline}}
\caption{PostScript example taken from~\cite{A-W:GMS94}}
\label{fig:b}
\source{F. Mittelbach}
\end{figure}
\caption{An illustration taken from\cite{A-W:GMS94}}
\end{figure}

\begin{figure}[pos]
\begin{figure}
\resizebox{.8\textwidth}{!}{\includegraphics{outline}}
\caption{PostScript example taken from~\cite{A-W:GMS94}}
\label{fig:b}
\source{F. Mittelbach}
\end{figure}
\caption{An illustration taken from\cite{A-W:GMS94}}
\end{figure}

\begin{figure}[pos]
\begin{figure}
\resizebox{.8\textwidth}{!}{\includegraphics{outline}}
\caption{PostScript example taken from~\cite{A-W:GMS94}}
\label{fig:b}
\source{F. Mittelbach}
\end{figure}
\caption{An illustration taken from\cite{A-W:GMS94}}
\end{figure}

There exist packages that extend the number of float types. (This information is given as a footnote to show that footnotes in this class come out below a bottom float.)
The result is shown in Figure 2 on the following page. If the illustration is to be manually pasted into the final document one can leave the right amount of space by using this command as follows:

\begin{figure}
  \spaceforfigure{2in}{1cm}
  \caption{Caption for a figure to be pasted in later}
  \label{fig:3}
  \source{F. Mittelbach}
\end{figure}

All standard \TeX units can be used to specify the space needed. The above example make room for an illustration that is two inches wide and one centimeter high. The result is shown as Figure 3 on the next page.

\section*{Tables}

Like with standard \LaTeX the optional \texttt{pos} argument can be used to specify into which float areas this float is allowed to migrate (default is \texttt{tbp}).

The environment \texttt{table*} is not supported as tables that need to span both columns are automatically recognized.

Typically the body of the environment would consist of a \texttt{tabular} environment responsible for producing the actual table including the table and stub headers.

\begin{table}
  \begin{tabular}{lrrrr}
    \hline
    & \tablehead{1}{r}{b}{Single\tablenote{2-9 retail outlets}\multiple} & \tablehead{1}{r}{b}{Large\multiple} & \tablehead{1}{r}{b}{Total} \\
    \hline
    1982 & 98 & 129 & 620 & 847 \\
    1987 & 138 & 176 & 1000 & 1314 \\
    1991 & 173 & 248 & 1230 & 1651 \\
    1998\tablenote{predicted} & 200 & 300 & 1500 & 2000 \\
    \hline
  \end{tabular}
  \source{Central Statistical Office, UK}
  \caption{Average turnover per shop: by type of retail organisation}
  \label{tab:a}
\end{table}

Vertical spacing between horizontal lines produced from \texttt{\hline} inside a \texttt{tabular} environment is controlled by the length parameter \texttt{\hlinesep} in this class. The default value (1pt) gives one point extra space above such

\section*{Command to specify the origin of the data given in the table. The \textit{text} will be printed in small italics below the table. (The use of this command is discouraged.)}

\begin{table}
  \begin{tabular}{lrrrr}
    \hline
    & \tablehead{1}{r}{b}{Single\tablenote*{2-9 retail outlets}\multiple} & \tablehead{1}{r}{b}{Large\multiple} & \tablehead{1}{r}{b}{Total} \\
    \hline
    1982 & 98 & 129 & 620 & 847 \\
    1987 & 138 & 176 & 1000 & 1314 \\
    1991 & 173 & 248 & 1230 & 1651 \\
    1998\tablenote*{predicted} & 200 & 300 & 1500 & 2000 \\
    \hline
  \end{tabular}
  \caption{Average turnover per shop: by type of retail organisation}
  \label{tab:a}
\end{table}

Like \texttt{\tablenote} but this time the raised footnote symbol will occupy space. This version is intended to be used in the middle of cells.

An example showing the use of all commands described above is shown in Table 1 on the next page. It was produced by the following input:

\section*{Command to produce a note to the table. It can only be used within a table environment and should be used only at the right end of a table cell. The command produces a raised footnote symbol at the place used which sticks into the right margin. As far as \LaTeX is concerned this symbol does not occupy any space. Thus it will not modify the alignment of table columns. The \textit{text} will appear below the table.}

In the current release notes to \texttt{\caption} or \texttt{\source} are not possible.

\section*{Command to ease the production of tables provided which is essentially an abbreviation for a \texttt{\multicolumn} command that additionally boldens its text argument. I.e., \texttt{\tablehead} specifies the number of columns the \textit{heading text} should span and \texttt{\hpos} defines the horizontal positioning of the text of the column(s), e.g., \texttt{l}, \texttt{r}, \texttt{c}, or \texttt{p\{\ldots\}}. In contrast to a simple \texttt{\multicolumn} command the \textit{heading text} can be split vertically by using \texttt{\\} to denote the line breaks. The \texttt{\vpos} argument should contain either \texttt{t}, \texttt{c}, or \texttt{b} denoting the vertical placement of the text in relation to other cells of that row. It is only relevant if the \textit{heading text} consists of more than one line. See the example table below that demonstrates the use of this command.}

\begin{table}
  \begin{tabular}{lrrrr}
    \hline
    & \tablehead{1}{r}{b}{Single\tablenote{2-9 retail outlets}\multiple} & \tablehead{1}{r}{b}{Large\multiple} & \tablehead{1}{r}{b}{Total} \\
    \hline
    1982 & 98 & 129 & 620 & 847 \\
    1987 & 138 & 176 & 1000 & 1314 \\
    1991 & 173 & 248 & 1230 & 1651 \\
    1998\tablenote{predicted} & 200 & 300 & 1500 & 2000 \\
    \hline
  \end{tabular}
  \caption{Average turnover per shop: by type of retail organisation}
  \label{tab:a}
\end{table}

\section*{Command to set length of horizontal lines produced from \texttt{\hline} inside a \texttt{tabular} environment is controlled by the length parameter \texttt{\hlinesep} in this class. The default value (1pt) gives one point extra space above such

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The **LaTeX** Companion

**FIGURE 2.** PostScript example taken from [4]

**FIGURE 3.** Caption for a figure to be pasted in later

**TABLE 1.** Average turnover per shop: by type of retail organisation

<table>
<thead>
<tr>
<th></th>
<th>Single outlet</th>
<th>Small multiple</th>
<th>Large multiple</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1982</td>
<td>98</td>
<td>129</td>
<td>620</td>
<td>847</td>
</tr>
<tr>
<td>1987</td>
<td>138</td>
<td>176</td>
<td>1000</td>
<td>1314</td>
</tr>
<tr>
<td>1991</td>
<td>173</td>
<td>248</td>
<td>1230</td>
<td>1651</td>
</tr>
<tr>
<td>1999</td>
<td>200</td>
<td>300</td>
<td>1500</td>
<td>2000</td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, UK

*a* 2-9 retail outlets

*b* predicted

Long tables

Tables which are longer than one page cannot be placed into a table environment as floats cannot have a size larger than a page. Such tables are supported by the standard LaTeX package `longtable` written by David Carlisle. However this package only works in single column mode.

When formatting for the AIP 8x11 double column proceedings, such tables can only be added at the end of the paper by preceding the `longtable` environments with a `\onecolumn` declaration.

The package is supported by the class in the sense that captions within a `longtable` environment will be formatted using the appropriate style; however in contrast to the `table` environment it is the responsibility of the user to place the caption at the top of the table. The commands `\source` and `\tablenote` are not supported within this environment, but the `\tablehead` command can be used to produce column heads if desired.

Refer to the `longtable` package documentation or to [6, p.122ff] for a detailed description of the syntax of the `longtable` environment.

A possible alternative is the package `supertabular` written by Johannes Braams; however in this case no attempt has been made to ensure that a table produced with `supertabular` conforms to the layout specification for the `aipproc` class. Be aware that this package defines its own `\tablehead` command (with a completely different function).

Refer to the package documentation for the syntax description. A detailed comparison between `supertabular` and `longtable` can be found in Chapter 5 of [6].

Counters

The `\alph` and `\fnsymbol` commands to represent counter values have extended ranges. For example `\alph` will now count up to 52 (zz) and the `\fnsymbol` command will produce the following symbols *, †, ‡, §, ¶, ††, ‡‡, §§, †††, ‡‡‡, §§§, and ††††. This will allow for up to 16 table notes per table. For documents that need a larger number of table notes select the option `tnotealph` to switch to lower case alphabetic letters to mark such notes.

Building floats manually

The original LaTeX environments `figure` and `table` as well as their star forms are still available under the names `ltxfigure` and `ltxtable`. They should not be used in normal circumstances but are provided in case the automatism of the `aipproc` class needs overwriting.

Please note that if these environments are used the position of the `\caption` command determines the placement of the caption within the float body and
that the special commands for figures and tables, e.g., \texttt{\textbackslash{}tablenote}, etc. as provided by this class are not available within these environments.

**Urls**

\url{data}

For documenting URLs and related data the \url command is provided. It allows breaking the URL in certain places and typesets it in an adequate font and format. Instead of using curly brackets the argument can be delimited by two identical characters not used in the argument.

**Bibliography**

Referring to other articles, books, etc. can be done using the \cite command of standard \LaTeX. The list of references itself can either be produced using standard \LaTeX methods or using \BIBTeX.

If installed, the aipproc class includes the \natbib system which offers an extended set of citation commands. These commands have been originally developed to support author/year citation styles but are also useful with numerical citation styles.

The \natbib system has two basic citation commands, \cite{textual} and \citep{parenthetical} citations, respectively. There also exist the starred versions \cite*{textual} and \citep*{parenthetical} that print the full author list, and not just the abbreviated one. All of these may take one or two optional arguments to add some text before and after the citation. Table 3 later on shows some examples. There are many more commands and variants, see [2] or [3] for further details.

**Bibliography produced manually**

\begin{thebibliography}{widest-label}
\bibitem{label}
Command to start a bibliographical entry having the label \textit{label} for use in \cite commands. Refer to the publishers manual, e.g., [1], for information on how to lay out individual entries. For example:

\begin{verbatim}
\bibitem{Brown2000}
Brown, M.-P., and Austin, K., \emph{The New Physique}, Publisher Name, Publisher City, 2000, pp. 212--213.
\end{verbatim}

If commands from \natbib (e.g., from table 3) should be usable, then additional information has to be passed to the \bibitem via an optional argument.

\begin{verbatim}
\bibitem[display-info]{label}
The optional argument \textit{display-info} should then, and only then, contain the author(s) name(s) followed by the year in parentheses without any spaces, for example:

\begin{verbatim}
\bibitem[Brown and Austin(2000)]{Brown2000}
\end{verbatim}

The essential feature is that the label (the part in brackets) consists of the author names, as they should appear in the citation, with the year in parentheses following. There must be no space before the opening parenthesis! This will be automatically produced if \BIBTeX is used.

**Bibliography produced using \BIBTeX**

The aipproc class is accompanied by \BIBTeX style files which can be used to produce compliant reference lists from \BIBTeX database files. To use \BIBTeX one first has to run the source file through \LaTeX then run \BIBTeX and then rerun \LaTeX twice to get all references resolved. \BIBTeX is described in more detail in appendix B of [6] and in chapter 13 of [4].

\begin{verbatim}
\bibliographystyle{style-name}
\end{verbatim}

This declaration specifies to \BIBTeX that the style \textit{style-name} should be used. It can be placed anywhere within the document but is usually positioned directly in front of the command described below.

Compliant \BIBTeX styles are aipproc (for use with natbib) and aipprocl (if natbib is missing at the site).

\begin{verbatim}
\bibliography{bib-list}
\end{verbatim}

This command denotes the position where the reference list produced by \BIBTeX will be included in the document. The \textit{bib-list} is a comma separated list of \BIBTeX database files.

**GENERAL REQUIREMENTS AND RESTRICTIONS**

This class was designed to work with \LaTeX 2ε release 1999/06/01 or a later version. Earlier releases may work but have not been tested.

With the exception of the packages natbib and url it only requires files which are part of a standard
TABLE 2. Files used by the aipproc class

<table>
<thead>
<tr>
<th>File</th>
<th>Date</th>
<th>Version</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
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The most recent \LaTeX distribution as well as \texttt{natbib} and \texttt{url} can be obtained from CTAN sites (Comprehensive \TeX Archive Network).

A ready to run \TeX system for various platforms which has everything required is available on CD-ROM, look into \url{http://www.tug.org/texlive.html}.

REFERENCES

2. Daly, P., Natural Sciences Citations and References (Author-Year and Numerical Schemes), 1999, distributed as \texttt{natbib.dtx} with the \texttt{natbib} software.
3. Daly, P., Reference sheet for \texttt{natbib} usage, 1999, distributed as \texttt{natnotes.tex} with the \texttt{natbib} software.
TABLE 3. Example of \texttt{natbib} commands and their results

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