

Quick L^AT_EX Examples

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v1.0

The purpose of this document is to provide a quick reference for implementing basic to advanced LaTeX typesetting examples that hydro-researchers are likely to require. To provide feedback for this document please visit: <https://docs.google.com/spreadsheet/viewform?formkey=dFRtanNmVEhUQzlKcHdsakdUQkY2eHc6MQ>

The following is a basic example of resulting output (top or left) and associated L^AT_EX code (bottom or right):

Example 1: Simple Document with Citing and References

Sample Document

John Smith

September 10, 2015

1 Name of Section

Hello World! This is the first line of the body of the document.

1.1 Name of Subsection

This is a paragraph Doe (2006) where something is referenced.

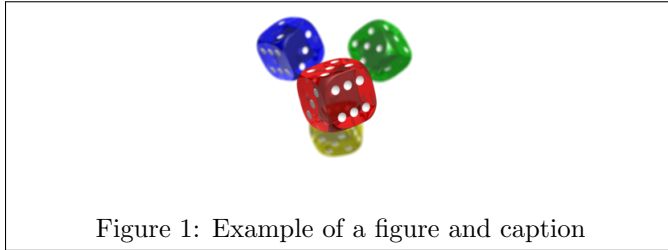
References

Doe, J. (2006). Dice.

```
1 \usepackage{natbib}
2 \title{Sample Document Title}
3 \author{John Smith}
4 \date{\today}
5 % end of Preamble (this is a comment).
6 \begin{document}
7 \maketitle
8 % \newpage % (uncomment '%' before \newpage for a pagebreak)
9 % \tableofcontents% (uncomment '%' before \tableofcontents for Table of contents)
10 \section{Section one}
11     Hello World! This is the first line of the body of
12     the document.
13     \subsection{Subsection}
14         This is a paragraph \cite{Dice2006}
15         where something is referenced.\\
16 \bibliographystyle{apalike}
17 \bibliography{Reference_Library}
```

For additional information to add Index, Glossary, footnotes, Marginpars, or Endnotes to a document, refer to <http://www.tug.org/tutorials/tugindia/>

Example 2: Simple Figure



```
1 \usepackage{graphicsx}
2 \graphicspath{{Figures/}}
3 \begin{document}
4 \begin{figure}[h]
5     \centering
6     \includegraphics[scale=.3]{Dice}
7     \label{fig:Dice}
8     \caption{Example of a figure and caption}
9 \end{figure}
10 \end{document}
```

Example 3: Simple Inline Equation

An example, $4 * 5 = 6 * \beta$ of inline math.

```
1 \usepackage{amsmath}
2 \begin{document}
3 An example,  $4*5 = 6*\beta$  of inline math.
4 \end{document}
```

Example 4: Simple Display Equation with Cross-reference

Generally, the Froude number is expressed as

$$Fr = \frac{V}{\sqrt{gD}} \quad (1)$$

where the hydraulic depth, $D = \frac{A}{T}$, is the ratio of wetted area, A , and top width, T . For a rectangular section, the Froude number can be simplified from (1).

```
1 \usepackage{amsmath}
2 \begin{document}
3 Generally, the Froude number is expressed as
4 \begin{equation} \label{eq:FrGeneral}
5     Fr = \frac{V}{\sqrt{g D}}
6 \end{equation}
7 where the hydraulic depth,  $D = \frac{A}{T}$ , is
8 the ratio of wetted area,  $A$ , and top width,
9  $T$ . For a rectangular section,
10 the Froude number can be simplified
11 from \eqref{eq:FrGeneral}.
12 \end{document}
```

Example 5: Aligning Multiple Equations

The following is a simplification of the froude number in a rectangular channel.

$$\begin{aligned} D &= \frac{A}{T} \\ &= \frac{T y}{T} \\ &= y. \end{aligned}$$

Thus,

$$Fr = \frac{V}{\sqrt{g y}} \quad (2)$$

```
1 \begin{document}
2 The following is a simplification of the
3 froude number in a rectangular channel.
4 \begin{align*}
5     D&= \frac{A}{T} \\
6     &= \frac{T y}{T} \\
7     &= y.
8 \end{align*}
9 Thus,
10 \begin{equation} \label{eq:FrRect}
11     Fr = \frac{V}{\sqrt{g y}}
12 \end{equation}
13 \end{document}
```

Example 6: Simple Table

W	X	Y	Z
2	4	6	8
4	8	8	9
16	16	10	10
256	32	12	11

```

\begin{document}
2 \begin{table}[h]
  %\centering %first option for centering
4 \begin{center} %second option for centering
  \caption{Test Table}
6 \begin{tabular}{|rccl|} \hline
  W & X & Y & Z \\ \hline
8 2 & 4 & 6 & 8 \\
  4 & 8 & 8 & 9 \\
10 16 & 16 & 10 & 10 \\
  256 & 32 & 12 & 11 \\ \hline
12 \end{tabular}
  \end{center}
14 \label{tab:TestTable}
\end{table}
16 \end{document}

```

Example 7: Data Files to Tables & Figures Using Various Packages

The following are typically data files that we will be using for the following examples

Source Listing: datafiles/Book1.txt

```

1 % Depth [feet] flow(cfs)
2 # lines starting with % or # are not read with pgfplots
3 % note for csvsimple % is the only valid comment (cannot use #)
4 0 0
5 2 20
6 3 70
7 4 116
8 5 300

```

Source Listing: datafiles/Book2.csv

```

1 time, flow
2 %[min], [cfs]
3 % lines starting with % are not read with csvsimple
4 0, 0
5 20, 40
6 30, 90
7 40, 116
8 50, 200

```

Source Listing: datafiles/data1.csv

```

1 date, value1, value2
2 2010-01-01 12:00, 2, 0
3 2010-01-01 23:15, 10, 1
4 2010-01-03 12:00, 8, 10

```

Example 7.1: Tables from data files using various packages

Example 7.1a: CSV file into table using *csvsimple* package

Using the `\csvautotabular` command is the most basic way to create a table from a data file, but has limited formatting control.

time	flow
0	0
20	40
30	90
40	116
50	200

```

\usepackage{csvsimple}
2 \begin{document}
  \begin{center}
4 \csvautotabular{datafiles/Book2.csv}
  \end{center}
6 \end{document}

```

Refer to <http://ctan.mackichan.com/macros/latex/contrib/csvsimple/csvsimple.pdf> for more information on the `\csvsimple` package.

Example 7.1b: Table from CSV file using *csvsimple* package (manual control of headers)

Using the `\csvautotabular` command is the most basic way to create a table from a data file, but has limited formatting control.

	time (min)	flow (cfs)
1	0	0
2	20	40
3	30	90
4	40	116
5	50	200

```

\usepackage{csvsimple}
2 \begin{document}
\begin{center}
4 \csvreader[tabular=|c|c|c|,
   table head=\hline & time (min) & flow (cfs)\hline,
6   late after line=\hline]
{datafiles/Book2.csv}{time=\time, flow=\flow}%
8 {\thecsvrow & \time & \flow}%
\end{center}
10 \end{document}

```

Refer to <http://ctan.mackichan.com/macros/latex/contrib/csvsimple/csvsimple.pdf> for more information on the `\csvsimple` package. For more examples see <http://texblog.org/2012/05/30/generate-latex-tables-from-csv-files-excel/>

Example 7.1c: Table from CSV file using *pgfplotstable* package

Time (sec)	Flow (cfs)
0	0
20	40
30	90
40	116
50	200

```

\usepackage{pgfplotstable}
2 \usepackage{booktabs}
%\usepackage{csvsimple}
\begin{document}
4 \begin{center}
\pgfplotstabletypeset[
6   col sep=comma,
   every head row/.style={
8     before row=\toprule,after row=\midrule},
   every last row/.style={
10    after row=\bottomrule},
   row predicate/.code={%
12    \ifnum#1>4\relax
14    \ifnum#1<8\relax
\pgfplotstableuserowfalse
16    \fi
\fi},
18   columns/time/.style ={column name= Time (sec)},
   columns/flow/.style ={column name=Flow (cfs)},
20 ]{datafiles/Book2.csv}
\end{center}
22 \end{document}

```

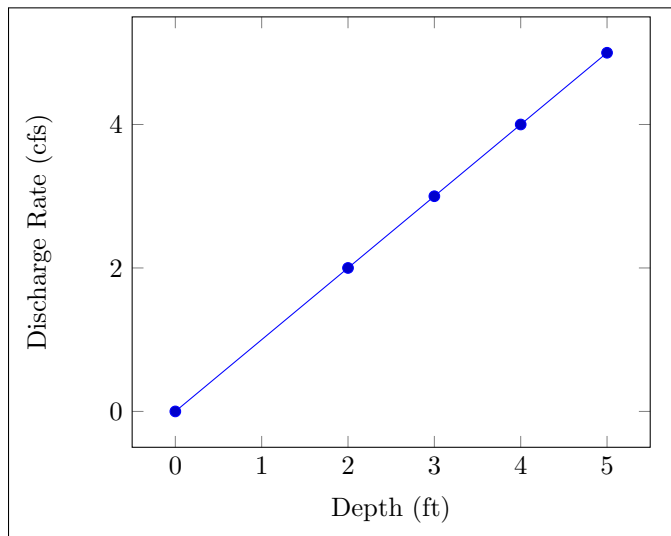
Refer to <http://pgfplots.sourceforge.net/pgfplotstable.pdf> for more information on the `\pgfplotstable` package. For more examples see <http://texblog.org/2012/05/30/generate-latex-tables-from-csv-files-excel/>

Example 7.2: Plots from various data files using the *pgfplots* package

The following examples are basic methods to create a plot in L^AT_EX from a data file. Refer to <http://pgfplots.sourceforge.net/> for more information on the `\pgfplots` package. (Direct links to manual: <http://pgfplots.sourceforge.net/pgfplots.pdf> and examples http://pgfplots.sourceforge.net/pgfplots_talk_FTUG_2012_final.pdf)

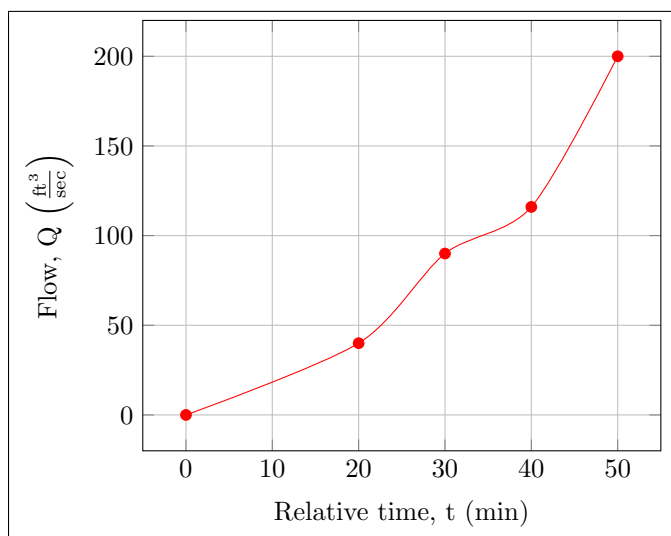
Example 7.2a: Plot from space delimited TXT file

The same data file used for the previous section will be used again to illustrate how to generate figures from the data files.



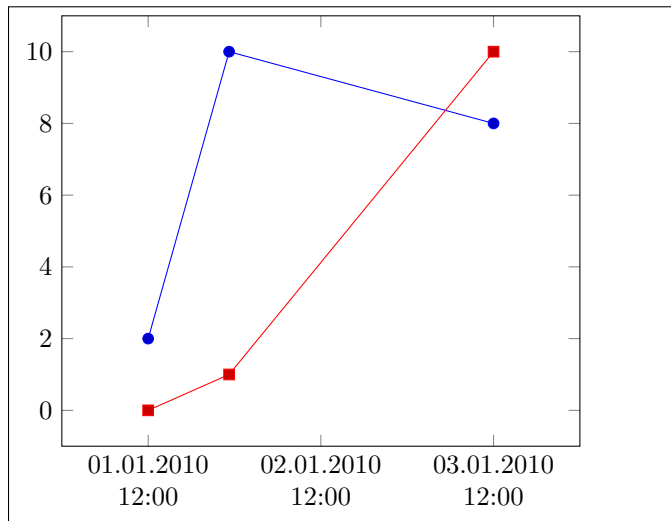
```
\usepackage{pgfplots}
2 \usepgfplotslibrary{dateplot}
\begin{document}
4 \begin{tikzpicture}
\begin{axis}[
6 xlabel=Depth (ft),
ylabel=Discharge Rate (cfs)
8 ]
\addplot table [col sep=space,
10 x index=0, y index=0,header=false]
{datafiles/Book1.txt};
12 \end{axis}
\end{tikzpicture}
14 \end{document}
```

Example 7.2b: Plot from CSV file (with additional formatting)



```
\usepackage{pgfplots}
2 \usepgfplotslibrary{dateplot}
\begin{document}
4 \begin{tikzpicture}
\begin{axis}[
6 grid=major,
xlabel={Relative time, t (min)},
8 ylabel={Flow, Q $\left(\frac{\text{ft}^3}{\text{sec}}\right)$}
]
10 \addplot[smooth,red,mark=*] table [
col sep=comma,
12 x=time, y=flow,
] {datafiles/Book2.csv};;
14 \end{axis}
\end{tikzpicture}
16 \end{document}
```

Example 7.2c: Plot of timeseries data from CSV file



```
1 \documentclass{article}
2 \usepackage{pgfplots}
3 \usepgfplotslibrary{dateplot}
4
5 \begin{document}
6 \begin{tikzpicture}
7 \begin{axis}[
8   date coordinates in=x,
9   xticklabel={\day.\month.\year\ \hour:\minute},
10  x tick label style={align=center},
11  date ZERO=2010-01-01, % Set near lowest date
12  xmin={2010-01-01},
13  xmax={2010-01-04},
14  xtick={2010-01-01 12:00, % Set tick marks
15         2010-01-02 12:00,
16         2010-01-03 12:00}
17 ]
18 \addplot table[col sep=comma,y=value1]{datafiles/data1.csv}
19 \addplot table[col sep=comma,y=value2]{datafiles/data1.csv}
20 \end{axis}
21 \end{tikzpicture}
22 \end{document}
```

Example 8: Nomenclature

To get this package to work go to the menu bar at the top of Texmaker and select “Options” → “Configure Texmaker” and set the makeindex value from “makeindex %.idx” to “makeindex %.nlo -s nomencl.list -o %.nls”. Then run MakeIndex from the “Tools” menu as part of the compiling procedure if you have modified any of the nomenclature list between compiles.

When using characters to represent things, such as, β or α , you may want a list of all variables listed in a Nomenclature section.

Nomenclature

- α The first letter of the Greek alphabet
- β The second letter of the Greek alphabet

```
1 \documentclass{article}
2 \usepackage{nomencl}
3 \makenomenclature
4 %end of preamble
5 \begin{document}
6 When using characters to represent things,
7 such as,  $\beta$  \nomenclature[2]{\beta}
8 {The second letter of the Greek alphabet}
9 or  $\alpha$  \nomenclature[1]{\alpha}
10 {The first letter of the Greek alphabet},
11 you may want a list of all variables
12 listed in a Nomenclature section.
13
14 \printnomenclature
15
16 \end{document}
```

Refer to <http://www-h.eng.cam.ac.uk/help/tpl/textprocessing/nomencl.pdf> and <http://www.ctex.org/documents/packages/contents/nomencl.pdf> for more information regarding the nomencl package. Adding an index or glossary can be done in a similar way <http://www.tug.org/tutorials/tugindia/chap16-prn.pdf> and <http://www.tug.org/tutorials/tugindia/>

Example 9: Databases

Allows for loading of CSV files and manipulating the data similarly to MS Excel. The user sort rows and can compute averages, sums, etc. The results can be in a Mail Merge in which an individual letter with associated information can be generated. <http://ctan.math.utah.edu/ctan/tex-archive/macros/latex/contrib/datatool/datatool.pdf>

Example 10: If Statements

IF statements allow you to have a single .tex file that can behave very differently depending on how the user configures it. For example, if you were creating an exam and wanted document version **with** and **without** you traditionally you have to created two separate document files. Using the IF macro in L^AT_EX allows you to have one unified .tex file and change the compiled output (e.g., question only, or question and solutions) simply by changing a single switch.

The two examples below use the same .tex file base, however line 6 was all that was changed between the two files. Note how different the output is. By modifying the end of the statement `\SOLtrue` with *true* or *false* changes the binary value of the SOL flag.

Thus, this allows for the solution to be within the same document but depending on the IF condition the solution can be hidden. `\newif\ifSOL` creates a SOL flag. Then `\SOLfalse` is used to set that flag to *false*. The solutions to the problems are inserted into the `\ifSOL` portion of the IF statement and will be displayed if the SOL is set to true (i.e., `\SOLtrue`) before the IF statement structure.

Question 1: What is the expression for the Froude number?

Answer not shown

```

1 \documentclass{article}
2 \begin{document}
3 \textbf{Question 1:} What is the expression for the
  Froude number?\
4 \\
5 \\
6 \newif\ifSOL\SOLfalse
7 \ifSOL
8 The general expression for the Froude number is as follows:
9 \[
10 Fr=\frac{V}{\sqrt{gD}},
11 \]
12 where $V$ is the mean velocity, $g$ is the acceleration
13 of gravity, and $D$ is the hydraulic depth which is the
14 wetted channel area divided by the channel top width
15 ($D=A/T$).
16 \else
17 Answer not shown
18 \fi
19 \end{document}

```

Question 1: What is the expression for the Froude number?

The general expression for the Froude number is as follows:

$$Fr = \frac{V}{\sqrt{gD}},$$

where V is the mean velocity, g is the acceleration of gravity, and D is the hydraulic depth which is the wetted channel area divided by the channel top width ($D = A/T$).

```

1 \documentclass{article}
2 \begin{document}
3 \textbf{Question 1:} What is the expression for the
  Froude number?\
4 \\
5 \\
6 \newif\ifSOL\SOLtrue
7 \ifSOL
8 The general expression for the Froude number is as follows:
9 \[
10 Fr=\frac{V}{\sqrt{gD}},
11 \]
12 where $V$ is the mean velocity, $g$ is the acceleration
13 of gravity, and $D$ is the hydraulic depth which is the
14 wetted channel area divided by the channel top width
15 ($D=A/T$).
16 \else
17 Answer not shown
18 \fi
19 \end{document}

```

Example 11: QR codes

Quick Response Codes (QR Codes) are a two-dimensional codes or matrix barcodes. For more information regarding QR codes, refer to http://en.wikipedia.org/wiki/QR_code. These can be created in LaTeX. In order to get the package `auto-pst-pdf` to compile you can do one of the following things:

Method 1:

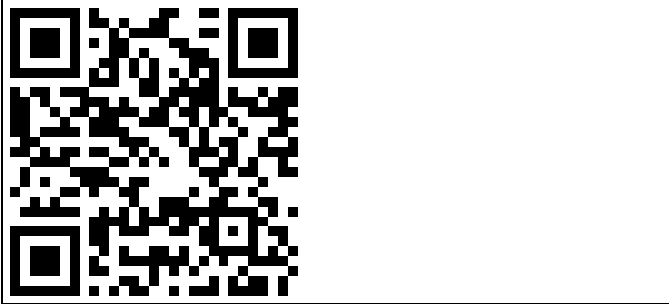
Set the “Quick Build” to; “LaTeX +dvips +ps2pdf + viewPDF”

Method 2:

In the menu bar at the top of Texmaker, select “Options” → “Configure Texmaker”. Add the following statement “–enable-write18” in the PdfLaTeX command line (e.g., on MS windows, “`pdflatex -synctex=1 -interaction=nonstopmode % .tex`” should be changed to “`pdflatex -synctex=1 -interaction=nonstopmode –enable-write18 % .tex`”). Then run “`pdflatex`” to compile the document.

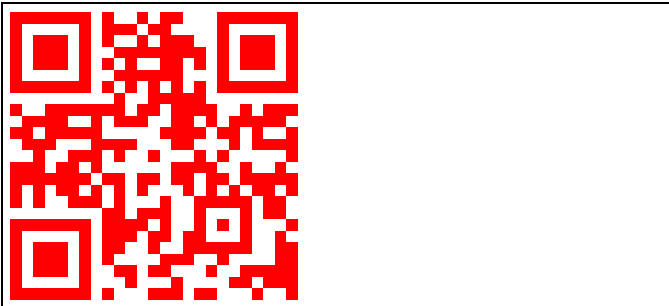
For more information refer to <http://ctan.mirrors.hoobly.com/graphics/pstricks/contrib/pst-barcode/pst-barcode-doc.pdf>

Example 11.1: Plain text information



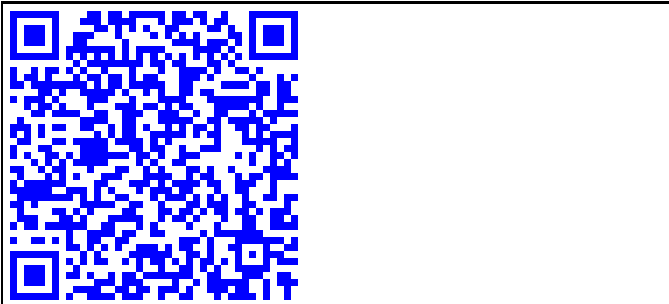
```
1 \documentclass{article}
2 \usepackage{auto-pst-pdf,pst-barcode}
3 \usepackage{xcolor}
4 \begin{document}
5 \begin{pspicture}(1.5in,1.5in)
6 \psbarcode[linecolor=black]
7 {Plain text string inserted here}
8 {eclevel=M width=1.5 height=1.5}{qrcode}
9 \end{pspicture}
10 \end{document}
```

Example 11.2: Weblink



```
1 \documentclass{article}
2 \usepackage{auto-pst-pdf,pst-barcode}
3 \usepackage{xcolor}
4 \begin{document}
5 \begin{pspicture}(1.5in,1.5in)
6 \psbarcode[linecolor=red]
7 {https://www.google.com/}
8 {eclevel=M width=1.5 height=1.5}{qrcode}
9 \end{pspicture}
10 \end{document}
```

Example 11.3: meCARD information



```
1 \documentclass{article}
2 \usepackage{auto-pst-pdf,pst-barcode}
3 \usepackage{xcolor}
4 \begin{document}
5 \begin{pspicture}(1.5in,1.5in)
6 \psbarcode[linecolor=blue]
7 {MECARD:N:Landry,Blake;TEL:
8 +12173338365;EMAIL:
9 hydrosystemslab@gmail.com;URL:
10 http:tungle.me/blakelandry;}
11 {eclevel=M width=1.5 height=1.5}{qrcode}
12 \end{pspicture}
13 \end{document}
```

Another option for using QR codes in L^AT_EX

Instead of using L^AT_EX to create QR codes you can use various online generators, save the resulting code, and embed the graphic into the LaTeX document as a figure. Below are some links to QR code generators and related helpful links:

- General QR code creator: <http://keremerkan.net/qr-code-and-2d-code-generator/>
- QR code creator with creative options: <http://www.qrhacker.com/>
- meCARD or vCARD creator:
<http://www.dmcinfo.com/Blog/articleType/ArticleView/articleId/296/The-DMC-vCard-MeCARD-QR-Code-Generator-ie-Business-Cards-for-Geeks.aspx>
- Basic QR code creator: <http://zxing.appspot.com/generator/>
- RGB to Hex color: <http://www.javascripter.net/faq/rgbtohex.htm>
- Track a QR code: <http://www.orionweb.net/2011/07/14/how-to-track-a-qr-code-in-google-analytics/>