

Tools Seminar

Week 4 - L^AT_EX Configuration & Usage*

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*This slide is partly based on pppppass's [ToolsSeminar](#) in PKU

- 1 Introduction
 - T_EX and L^AT_EX
 - Basic Concepts
- 2 Basic Typesetting
 - Text Mode
 - Math Mode
- 3 Further Topics

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Introduction

What is T_EX and L^AT_EX?

- ① T_EX is a typesetting system originally designed by Donald Knuth. (*The Art of Computer Programming*)
- ② L^AT_EX is a typesetting system based on T_EX designed originally designed by Leslie Lamport. → L^AT_EX2_ε
- ③ Basic idea of T_EX and L^AT_EX: “What you think is what you get”, distinguished from “What you see is what you get” (WYSIWYG)
- ④ Programming mechanism of T_EX and L^AT_EX is based on macros.

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When not to use L^AT_EX: the material is highly unstructured

T_EX & L^AT_EX Distributions & Engines

L^AT_EX Distributions:

- [TeXLive](#) (cross-platform), [MacTeX](#) (Mac OSX), MikTeX (Windows)
- [CTeX](#) (Chinese)
- [Overleaf](#) / shareLaTeX (online)

Engines:

- PdfLaTeX: .dvi → .pdf
- XeLaTeX: Unicode (UTF-8)
- LuaLaTeX: Support script language Lua

Basic Structure of a Document

- ① Command `\documentclass{...}`: `article`, `ctexart` and `beamer`
- ② Preamble: definitions and `\usepackage{...}`s
- ③ Top matters: `\title{...}`, `\author{...}` and `\date{...}`
- ④ Begin a document environment: `\begin{document}`
- ⑤ Section: `\section{...}`, `\subsection{...}` and so on
- ⑥ Paragraphs separated by a single blank line
- ⑦ End a document environment: `\end{document}`

* Demo

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Basic Typesetting

Text Formatting

- ❶ Comments: `%`
- ❷ Special characters: `\&`, `_`
- ❸ Whitespace: `,`, `\`, `!`, `\hspace{...}`
Use *two* blank lines to initiate a new paragraph (newline only adds one whitespace for English)
- ❹ Paragraphs: `\\` (no indent), `\par` (indent), and two blank lines (indent)
- ❺ Orthogonal coordinates of fonts:
English: `\textbf{...}`, `\textrm{...}`, `\textit{...}`
Chinese: `\kaishu`, `\heiti`
- ❻ Emphasize: `\emph{...}`
- ❼ Font size: `\tiny`, `\small`, `\large`, `\Large`, `\LARGE`
- ❽ Align: `\centering`, `\raggedright`

Basic Environments

```
\begin{environment_name}...\end{environment_name}
```

- ① Quotes: `quote`
- ② Lists: `enumerate`, `itemize` and package `enumitem`
- ③ Theorems: `\newtheorem` and package `ntheorem`
- ④ Verbatim: `\verb'...'`
- ⑤ Program lists: `lstlisting` and package `listings` / `minted`

Mathematical Symbols

Use `$` for inline formulas, and `\[\]` for displayed ones (or `\displaystyle`)

- ① Types: normal texts, operators, binary operators, relations accents
- ② Fonts: `\mathrm{...}`, `\mathbf{...}`
- ③ Normal symbols: `\exists`, `\forall`
- ④ Operators: `\log`, `\sin`
- ⑤ Binary operators: `+`, `\setminus`, `\otimes`
- ⑥ Relations: `\leq`, `\equiv`, `\approx`
- ⑦ Whitespace: `\,`, `\!`
frequently used: `\mathop{\mathrm{d}}\!` x

Function lists: <https://katex.org/docs/supported.html>

Formula Structures

- ① Subscript and superscript: `_` and `^`
- ② Fraction and binominals: `\frac{...}{...}`, `\binom{...}{...}`
- ③ Roots and radicals: `\sqrt{...}`
- ④ Huge operators: `\sum`, `\product`, `\bigoplus`
- ⑤ Delimiters: `\left`, `\right`, and brackets like `\lfloor`
- ⑥ Matrices: environment `matrix`, `bmatrix` and package `amsmath`

Mathematical Environments

- ① Basic equations: environment `equation`
- ② Matrices: environment `matrix`, `bmatrix`
- ③ If-cases: environment `cases`
- ④ Gathered equations: environment `gather`
- ⑤ Aligned equations: environment `align`
- ⑥ Formulas in formulas: environment `split`, `gathered` and `aligned`

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Further Topics

Bibliography

- ① BibTeX or the `bibliography` environment
- ② Footnote: `\footnote{...}`
- ③ Cite: `\cite{...}`
- ④ Display:
 - `\bibliographystyle{...}`: `plain`, `unsrt`
 - `\bibliography{...}`

Macros

- `\def`
- `\newcommand`

Floats

- ① Environment figure
- ② Environment table
- ③ Package graphicx
- ④ [htbp], package float and [H]
- ⑤ Use `\ref{...}` to cross reference

Tables

- 1 Environment `tabular` and `array`
- 2 Column formats: e.g. `|c|rrrlr|`
- 3 Align: `&` and `\`
- 4 Row lines: `\hline`

Other Useful Packages

- ① Layout: `geometry`
- ② Longer table: `longtable`
- ③ Algorithms: `algorithm2e` or `algorithm`
- ④ Hyper-links: `hyperref`
- ⑤ Include .pdf files: `pdfpages`

Other Useful Things

- Markdown × \LaTeX (Web support)
 - [KaTeX](#)
 - [MathJax](#)
- VS Code × \LaTeX
 - Make sure you have installed TeXLive first
 - [LaTeX Workshop Extension](#)

Other Useful Things

- [Mathpix](#): PDFs or handwritings \rightarrow \LaTeX
- [Detexify](#): Handwriting symbols \rightarrow \LaTeX
- [Tables Generator](#)
- [Excel2LaTeX \(online\)](#)
- [Excel2LaTeX \(macro\)](#)
- [Pandoc](#): Markdown, Word, \LaTeX , etc. translation