OPCUG Q&A
# LaTeX – A document Preparation System

STEPHANE RICHARD

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Problem

- ▶ While studying for my Master Degree at Laval University from 1988 to 1990, I had to write a thesis.
- ▶ The word processing software of the time, and probably most current modern word processor, were not able to do the following:
  - ▶ Display numbered complex mathematical equations which can be easily referenced in the text.
  - ▶ Display table with text, image, and equations which can be easily referenced in the text and automatically positioned in the document.
  - ▶ Display image (graphic) which can be easily referenced in the text and automatically positioned in the document.
  - ▶ Format bibliography items based on the type of reference (e.g., book, article, etc.) which can be easily referenced in the text.
- ▶ So, I was looking for another solution.
- ▶ A colleague suggested that I look at LaTeX.

Why LaTeX?

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- Word processing and typesetting are two different things.
- LaTeX is far superior to setting large documents, which is what it was designed for:
  - You can write something up in LaTeX and hand it to a book publisher or a magazine publisher and with minimum effort they can publish it.
  - It was written to deal with the deficiencies of digital typesetting software of the time and has become the de facto standard for setting publications in math, computer science, physics and some other fields.
  - The big advantage is that you can focus on the content and not worry about the layout or formating.
  - By default, LaTeX will generally do an excellent job of handling the layout details for you.
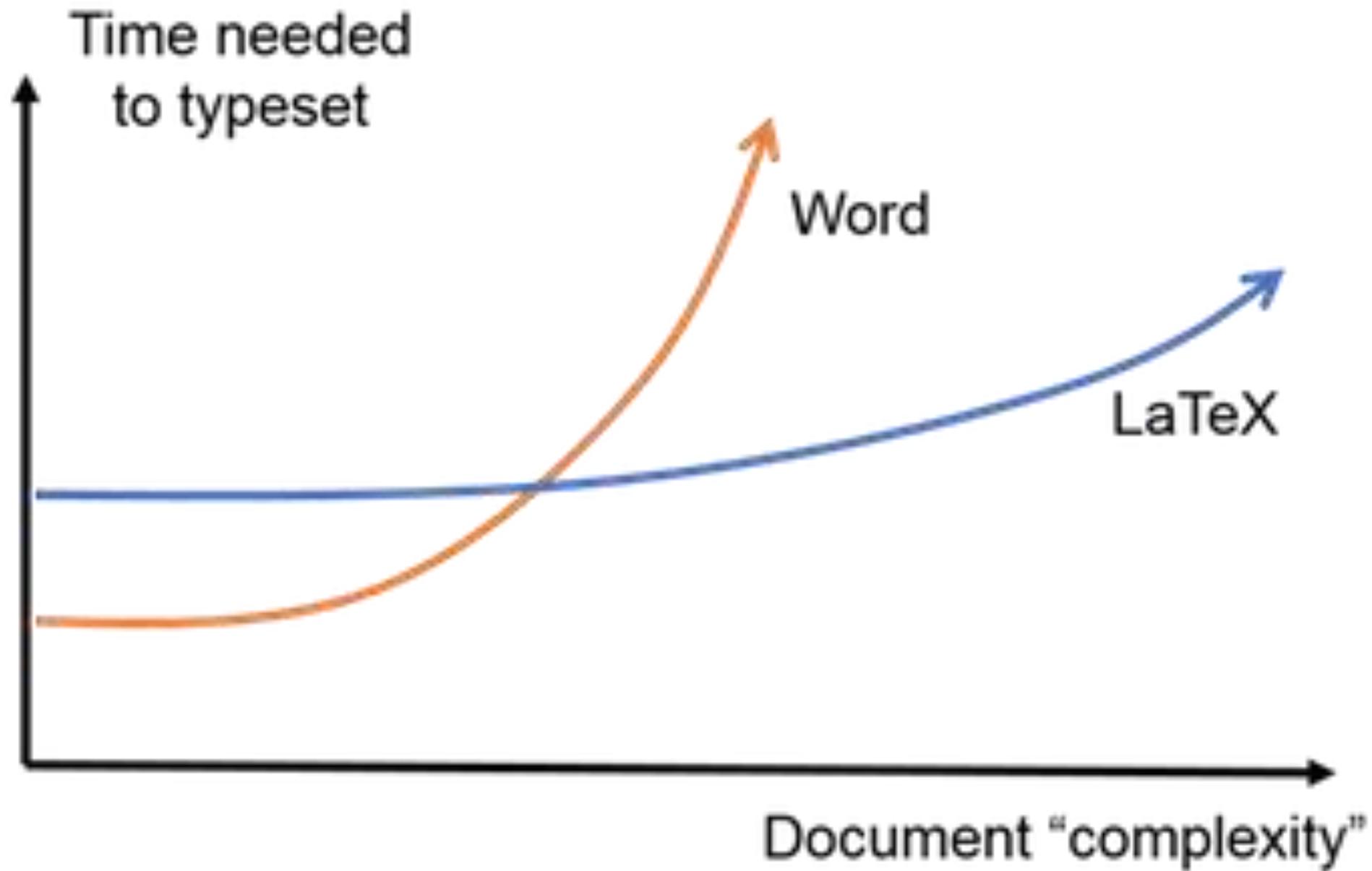
LaTeX Versus TeX

▶ TeX is a typesetting program which was designed and written by computer scientist and Stanford University professor Donald Knuth and first released in 1978.

▶ LaTeX is a set of commands with specific programmed behaviour which are, ultimately, constructed from layers of lower-level TeX primitive commands.

▶ LaTeX was created in the early 1980s by Leslie Lamport.

▶ Over the years, many packages were created that provide additional options or functionality:

  ▶ Define the acronym once, and LaTex will expand it on first use, regardless if you move text around.

  ▶ Long table that can span many pages
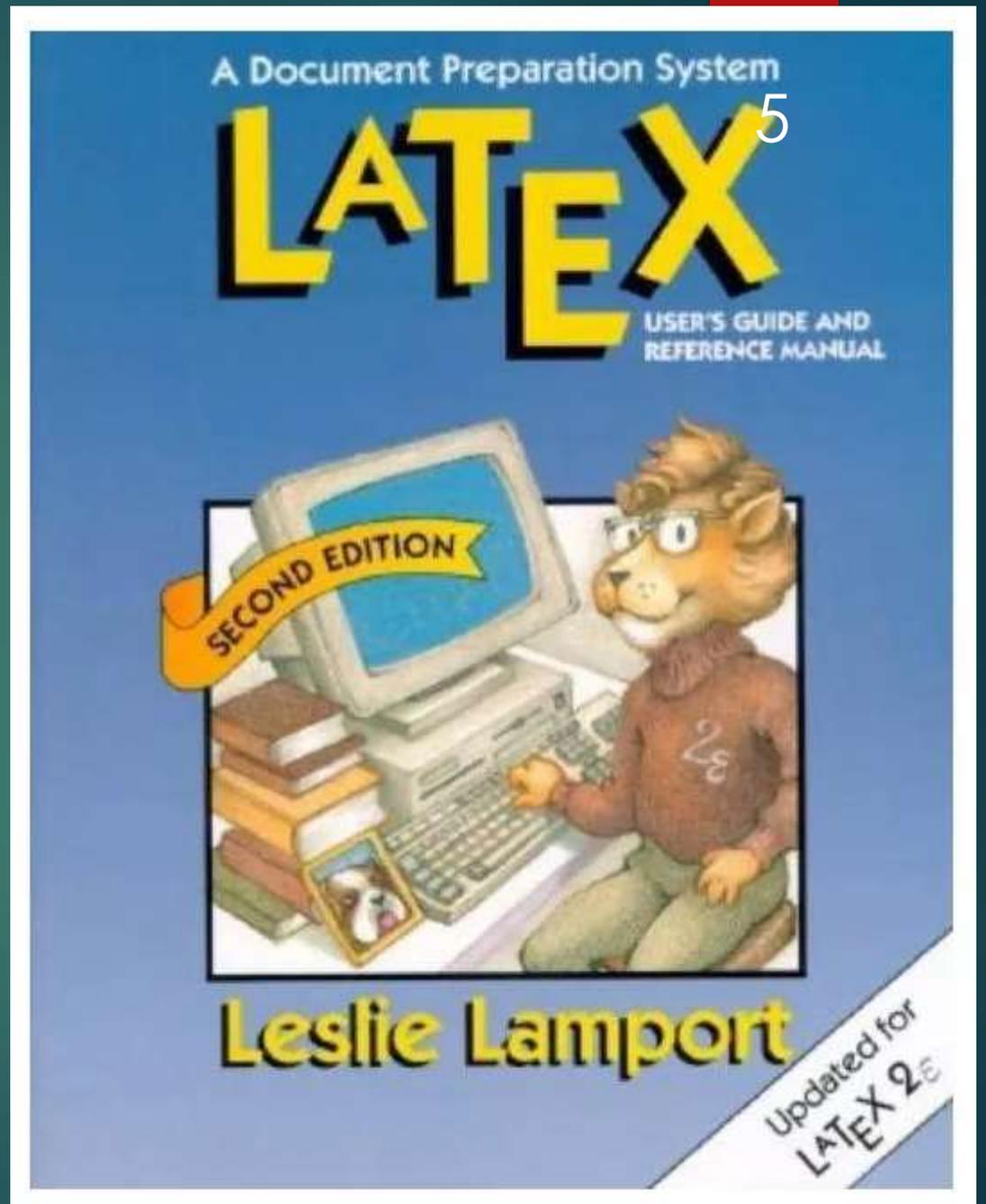
Example of LaTeX commands

- General format for a command is \command[option]{argument}
- \documentclass[option]{argument}
- Document:
  - \begin{document}
  - \end{document}
- \include{filename}
- Title:
  - \title{title text}
  - \author{author text}
  - \date{date text}
  - \maketitle

- Contents and lists:
  - \tableofcontents
  - \listoffigures
  - \listoftables
- Sections and hierarchy:
  - \part{part name}
  - \chapter{chapter name}
  - \section{section name}
  - \subsection{subsection name}
  - \subsubsection{subsubsection name}
  - \paragraph{paragraph name}
  - \subparagraph{subparagraph name}

Example of Commands - Continued

- Cross-Reference:
  - \label{labelname}
  - \ref{labelname}
    - LaTex will make sure that the object with the labelname will be after the ref or on the same page.
- Mathematics equations:
  - \begin{equation}
  - \frac{\partial^2 \theta}{\partial s^2} = s f_g\cos(\theta) + sf_x\cos(\phi)\sin(\theta).
  - \label{labelname}
  - \end{equation}

- Figures:
  - \begin{figure}
  - \includegraphics[options]{filename}
  - \caption{figure caption}
 - \label{labelname}
  - \end{figure}
- Tables:
  - \begin{table}
  - \begin{tabular}
  - \end{tabular}
  - \caption{Table caption}
  - \label{labelname}
  - \end{table}

$$\frac{\partial^2 \theta}{\partial s^2} = sf_g\cos(\theta) + sf_x\cos(\phi)\sin(\theta)$$

Bibliography data

- The .bib file data:
  - @book{adams79,
  - author = "Douglas Adams",
  - title = "The {H}itchhiker's {G}uide to the {G}alaxy",
  - year = 1979,
  - publisher ="Pan Books",
  - }
- BibTeX will take care of the formatting depending if it is a book, an article, etc.

- Citing a reference:
  - This book\cite{adams79} is amazing!
  - \cite[p. ~45]{cite_key}
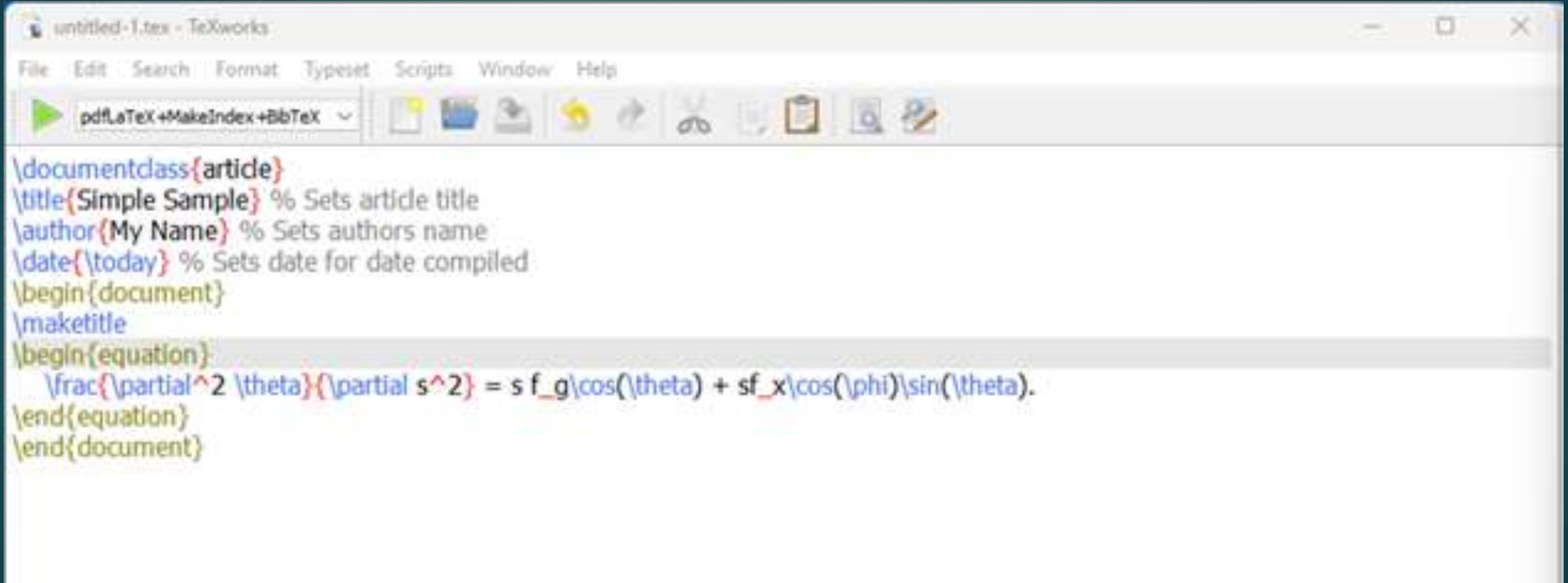- You do not need to use all of the references that are in the .bib file(s).
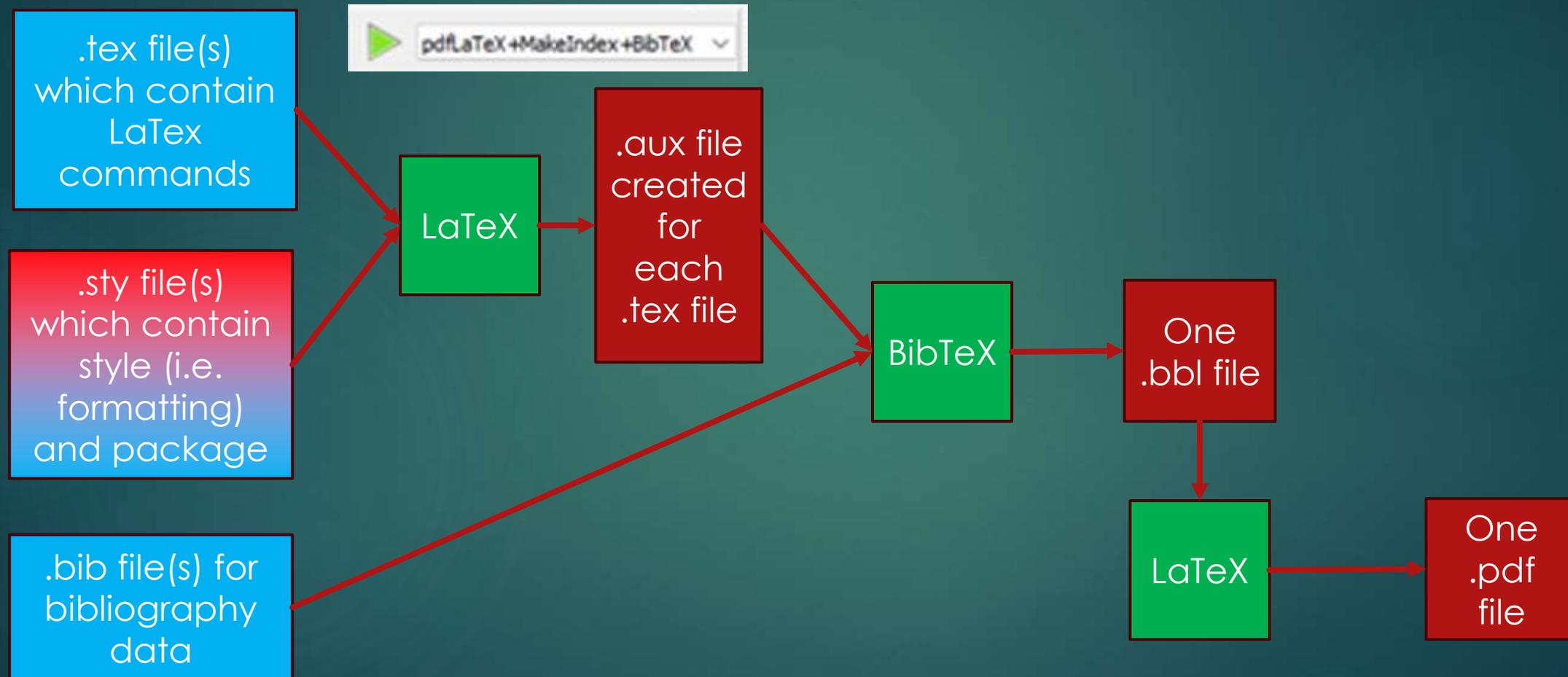
The environment

- There are many implementations of Tex and Latex.
- There is a lot of documentation available with examples.
- There are spell and grammar checkers available (e.g., Texldote)
- I use MikTex - https://miktex.org/, see screen shots on next slides.
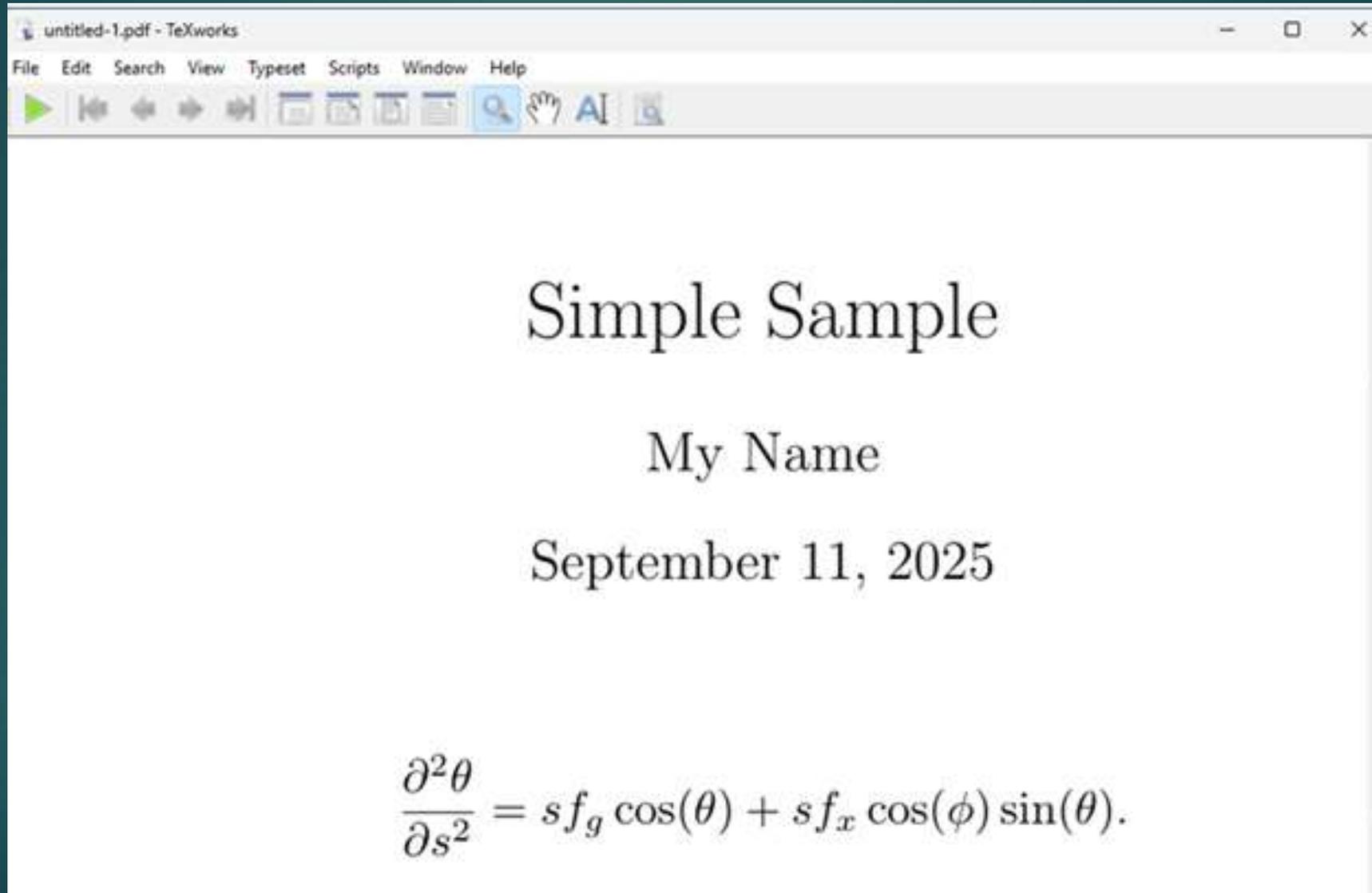
The creation application TeXworks

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The resulting document

Results of TeXLint analysis

Here is the result of analyzing your LaTeX file with TeXLint.

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%% Something that looks like a regular LaTeX file
%%
%% By me
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

\documentclass{article}
\usepackage[english]{babel}

\begin{document}

\title{My Paper}
\maketitle

A first paragraph with some stuff, some \textbf{bold text} and other things, like a
citation \cite{my:paper} . The text is not evenly spaced.

Hello world! The tex also, contains error of \emph{gramar and and spelling}. or use this text too
see an few of of the problems that LanguageTool can detecd. What do you thinks of grammar
checke...                                    a blue marker: It's 5 P. M. in the
after...                              017 .
```
Use 'a' instead of 'an' if the following word doesn't start with a vowel sound, e.g. 'a sentence', 'a university' (226)
```
\begin{figure}
\includegraphics{my_fig}
\caption{The figure's caption}
\label{fig:thisfig1}
\end{figure}

\section{a first section}

Here ,I forget to put a space after a comma. I refer to \ref{fig:thisfig1} in the text, but I do not
refer to the second one. I can mention a filename such as \verb+myfile.txt+; some rules don't apply
to this special markup: however, if I write myfile.txt , I'm likely to get a warning about a period
```

Putting it altogether – output samples

FROM MY FRENCH M.SC. THESIS

\maketitle

FACULTÉ DES SCIENCES ET DE GÉNIE

LOCALISATION DE DÉFAUTS MULTIPLES SUR
UNE LIGNE TÉLÉPHONIQUE À L'AIDE
DE TECHNIQUES RÉFLECTOMÉTRIQUES

STÉPHAN RICHARD

Mémoire

présenté

pour l'obtention

du grade de maître ès sciences (M.Sc.)

Table des matières

\tableofcontents

\listoffigures

\listoftables

\chapter{Introduction}

Chapitre I

Introduction

L'objectif fondamental de ce travail est la détermination d'une technique qui

Code	Distance (pieds)	Distance (m)	Code	Distance (pieds)	Distance (m)
B	3000	914.4	M	9000	2743.2
C	929	283.2	X	680	207.3
D	4500	1371.6	Y	2130	649.2
E	5575	1699.3	Z	5280	1609.3
H	6000	1828.8			

Tableau 2.1: *Distance selon le code.*

coupure f_c d'une ligne chargée peut être calculée à l'aide de l'équation suivante :

$$f_c = \frac{1}{\pi\sqrt{LCl}} \quad \text{Hz} \tag{2.1}$$

où L est la valeur de la bobine de pupinisation, C est la capacité par unité de

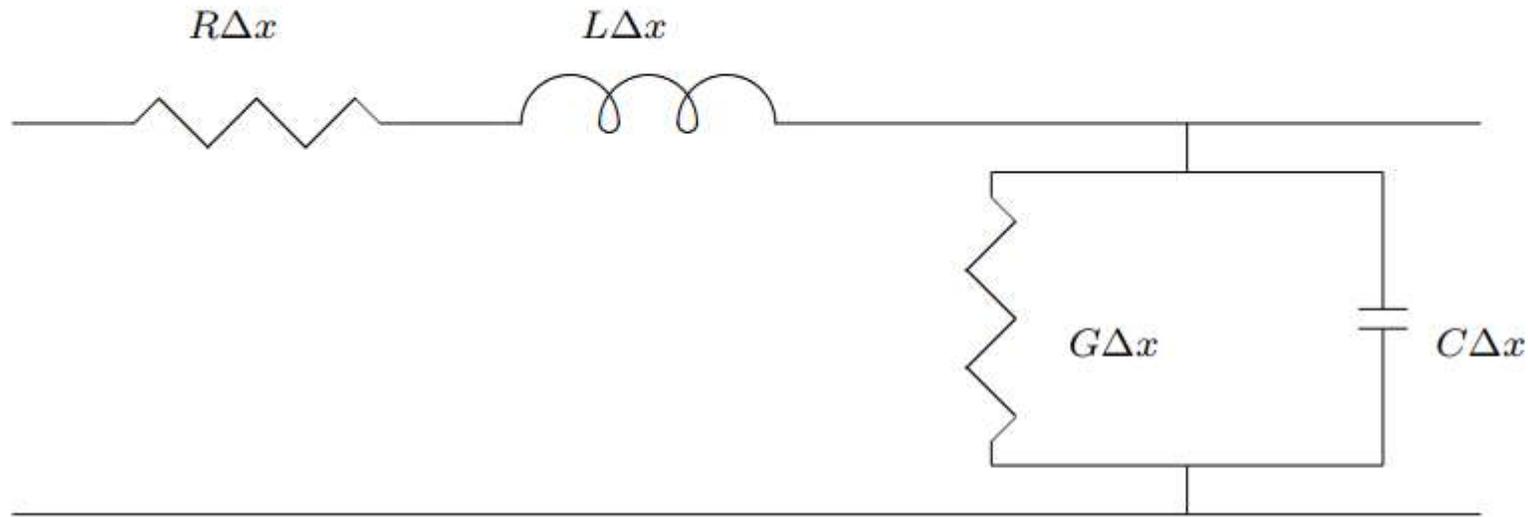LaTeX has its own set of basic drawing commands to make diagram.

Figure 2.2: *Circuit équivalent en L d'un élément de ligne de transmission de longueur Δx.*

Cas	$V(t)$	$V(0)$	$V(\infty)$
A	$E_i((1 + \frac{R-Z_0}{R+Z0}) + (1 - \frac{R-Z_0}{R+Z0})e^{(-t/\tau_A)})$	$2E_i$	$(1 + \frac{R-Z_0}{R+Z0})E_i$
B	$E_i((1 + \frac{R-Z_0}{R+Z0})(1 - e^{(-t/\tau_B)}))$	0	$(1 + \frac{R-Z_0}{R+Z0})E_i$
C	$E_i((1 + \frac{R-Z_0}{R+Z0})e^{(-t/\tau_C)})$	$(1 + \frac{R-Z_0}{R+Z0})E_i$	0
D	$E_i(2 - (1 + \frac{R-Z_0}{R+Z0})e^{(-t/\tau_D)})$	$(1 + \frac{R-Z_0}{R+Z0})E_i$	$2E_i$

Tableau 4.1: *Equations mathématiques des réflexions pour des charges complexes en bout de ligne.*

s d'insertion sur la boucle [1, pp. 212-213].

Références

[1] Transmission Systems for Communications, Members of the Technical Staff
Bell Telephone Laboratories, Bell Telephone Laboratories, Holmdel, N-J, Fifth
edition, 1982.

[3] L. M. Manhire, *Physical and Transmission Characteristics of Customers Loop
Plant*, BSTJ, Vol 57, n° 1, January 1978, pp. 35-59.

Depending on the style definition, the header will be set to most recent subsection.

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3.4. *PUBLISHED ARCHITECTURES*

it is obvious that better performance comes with the need to apply more resources toward security enforcement. For example, a "Null DS-TC" architecture has a very low O_{SRI}, but also has a very low O_{PI}; as for a "Co-Resident TCBs" architecture has a relatively high O_{PI}, but also has a high O_{SRI}. Thus, it is more likely that an architecture with a low O_{SRI} can a be certified to a high TCSEC's evaluation class.

3.4 Published Architectures

Any Questions?