Simple Example of an Article Prepared in LaTeX

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Abstract

This document presents a simple introductory example of a document written in LaTeX. The article includes examples of references, tables, figures and equations.

1 Introduction

LaTeX is a program for typesetting technical documents. It is especially well suited to mathematical typesetting.

2 Compilation without references

To compile a LaTeX document without references issue the following commands:

```
pdflatex mydocument.tex
pdflatex mydocument.tex
```

where the file "mydocument.tex" is the name of the file containing your LaTeX source. The reason it needs to be compiled twice is to allow cross-references such as equation numbers and table numbers to be updated.

3 References

3.1 Using BibTeX

The BibTeX program can be used for references. This allows the user to maintain a single file where references can be stored. Only the references that are cited in the document will be included in the bibliography. An example of a reference is Knuth [1984]. See the file called "bibexample.bib" to see the syntax for references. The natbib package also allows references in parentheses like this: [Knuth, 1984].

3.2 Compiling a document with BibTeX references

To compile a document that uses BibTeX for references, issue the following commands:

```
pdflatex mydocument.tex
bibtex mydocument.aux
pdflatex mydocument.tex
pdflatex mydocument.tex
```

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4 Equations

Typesetting of equations is where LaTeX really shines. Section 4.1 is an example section from Milliken [2000] that illustrates the typesetting of mathematical content.

4.1 Example of some mathematical text

This section contains an excerpt from Milliken [2000] that illustrates LaTeX' typesetting capability. The "definition" environment, defined earlier in the LaTeX source for this document, is a variation of the "theorem" environment.

"The uncertainty inputs $w_i(t)$ are related to the uncertainty outputs $z_i(t)$ by L_2 induced norm bounded operators; thus $w(t) \in \mathcal{W}$ where

$$\mathcal{W}=\{w(t) : w_p(t) \in L_2, \|w_i(t)\| \leq \|z_i(t)\|, i = 1 \dots k\} \tag{1}$$

For the sake of simplicity of exposition, it is required that $D'_{12_p} D_{12_p} > 0$ and $D'_{12} C_1 = 0$. These two standard assumptions may be relaxed with some additional complexity of the results presented in the sequel.

The performance is measured by the cost function

$$J_\gamma(u(t), w(t), x(0)) = \|z_p\|^2 - \gamma^2 \left(\|w_p\|^2 + x(0)' R x(0)\right) \tag{2}$$

where $R > 0$ is a specified weighting matrix.

The following algebraic Riccati equation plays an important role in the sequel:

$$0 = A'P + PA + P(B_1 \tau_\gamma B_1' - B_2 \bar{R}^{-1} B_2')P + C_1' \tau^{-1} C_1. \tag{3}$$

where $\bar{R}(\tau, \gamma) = D'_{12} \tau^{-1} D_{12}$, and $\tau_\gamma \in \mathbf{R}^{p \times p}$ is a scaling matrix of the form

$$\tau_\gamma = \begin{pmatrix} \gamma^{-2} I_{p_p} & 0 & & \\ 0 & \tau_1 I_{p_1} & 0 & \\ & 0 & \ddots & 0 \\ & & 0 & \tau_k I_{p_k} \end{pmatrix}, \tag{4}$$

where I_{p_i} is the $p_i \times p_i$ identity matrix and $\tau_i \in \mathbf{R} > 0$. Also, $\tau \triangleq \tau_\gamma$ with $\gamma \equiv 1$ and $\tau_0 \triangleq \tau_\gamma$ with $\gamma^{-2} \equiv 0$.

Definition 4.1 *A solution P to (3) is stabilising if and only if $\tilde{A} + B_2 K$ is stable, where*

$$\tilde{A} = A + B_1 \tau_\gamma B_1' P \tag{5}$$

$$K = -\bar{R}^{-1} B_2' P \tag{6}$$

Definition 4.2 *For a given value of γ, the set of matrices $\tau > 0$ for which there exists a stabilising solution P to (3) such that $0 < P \leq \gamma^2 R$ will be denoted $\Gamma_{SF}(\gamma)$."*

5 Tables and figures

An example table is shown in Table 1. Tables and figures are usually allowed to float so LaTeX decides where they will be located. Similarly, Figure 1 shows and example figure.

Table 1: Example table

Column 1	Column 2	Column 3
1	2	3
a	b	c

Figure 1: Images scaled to the same height

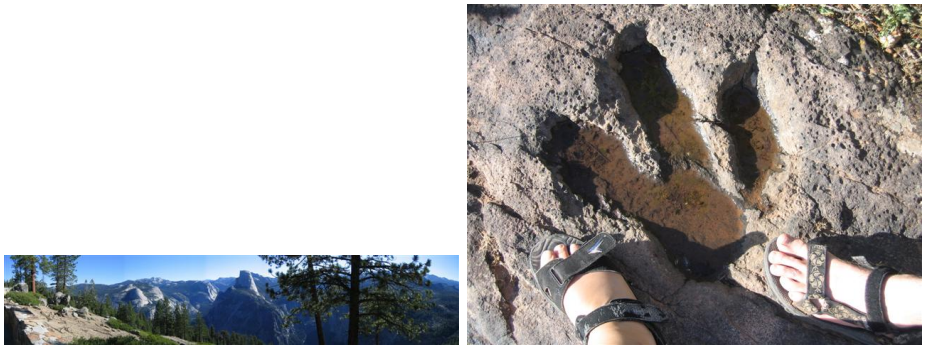

Figure 2: Images scaled to the same width

References

D. E. Knuth. *The TEXbook*. Addison-Wesley, 1984.

P. C. Milliken. *Minimax Approaches to Robust Control*. PhD thesis, Massey University, NZ, 2000.