Showing the 2004 IUCF REU Students the Wonders of LaTeX

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Abstract

In this article, I attempt to show the 2004 IU REU students the power of computer typesetting. I try to distinguish typesetting from word processing. I ridicule those who use word processing for scientific documents. I make rude remarks; I insult their pets and relatives. I make sure that they will *never* use a regular word processor again. *Bwaaah–hah hahhh!*

1 Introduction

1.1 Why Do We Use LaTeX ?

LaTeX is a *typesetter*, not a word processor. Word processors are for girly–men. Typesetters are for physicists with pumpitude.

To make a new paragraph in LaTeX , skip a line.

You have a choice of fonts in LaTeX . You can print in *italics*, **boldface**, *slanted*, `typewriter` and sans–serif.

1.2 LaTeX Does Math!

It sure does! You can put mathematics inside of paragraphs: $c = \sqrt{a^2 + b^2}$, or you can *display* equations:

$$\int_0^1 x^2 dx = \frac{1}{3} \qquad \int \cos(x) dx = \sin(x)$$

It will automatically number equations too.

$$-\frac{\hbar^2}{2M}\nabla^2\Psi(\mathbf{R}) + V(\mathbf{R})\Psi(\mathbf{R}) = E\Psi(\mathbf{R}) \tag{1}$$

Of course, you will recognize Eq. 1 as the Schrödinger equation!

Next, we study the electromagnetic field–strength tensor:

$$F^{\alpha\beta} = \partial^\alpha A^\beta - \partial^\beta A^\alpha = \begin{pmatrix} 0 & -E_x & -E_y & -E_z \\ E_x & 0 & -B_z & B_y \\ E_y & B_z & 0 & -B_x \\ E_z & -B_y & B_x & 0 \end{pmatrix} \tag{2}$$

Yes, LATEX can do *lots* of equations!

$$W_{\mu\nu}(p,q) = \frac{1}{4M}\sum_\sigma \int \frac{d^4\xi}{2\pi} e^{iq\cdot\xi}\langle p,\sigma|[J_\mu^{em}(\xi), J_\nu^{em}(0)]|p,\sigma\rangle$$

And here's another one! I can't help myself! I'm a wild, crazy, equation–writin' fool! *Bwaaaahh-hahh hahh!*

$$\frac{dq_i(x,t)}{dt} = \frac{\alpha_s(t)}{2\pi}\int_x^1 \frac{dy}{y}\left[P_{qq}(x/y)q_i(y,t) + P_{qG}(x/y)G(y,t)\right]$$

1.3   LATEX Does Tables!

Country	Language	Currency	1 USD =
Canada	English/French	Dollar	1.376 CAD
Czech Rep.	Czech	Koruny	31.82 CZK
Belgium	Belch	Euro	1.000 EUR
Albania	Albanian	Leke	142.3 ALL
Burkina Faso	French	Franc	752.8 XOF

1.4   LATEX Can Do Figures! But if You Spend Too Much Time on This, Andy Bacher Will Yell At Me!

The most awkward aspect of LATEX is the inclusion of figures in a document. It can be done, but it's tricky and can consume enormous amounts of time that is better spent on the *content* of your paper. I'll discuss some simple ways to include pictures, but I advise you to do the simplest thing that works.

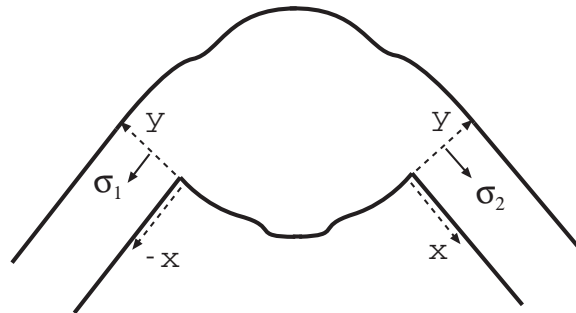Figure 1: Sorry, we don't take Czechs.

Figure 2: Interior region and leads.

The first method is to just skip some space in the document and paste in the picture later on. And that is what I did in Fig. 1. When the original document was printed, there was nothing in this space. But now there is!

Of course, you've *got* to use the (literal) cut–and–paste method if your picture is not stored in electronic (i.e. PostScript) form.

If you *do* have an illustration in PostScript form, it's not *too* difficult to print it with the document. An example is given in Fig. 2.

Both of these figures "floated" to the top of the current page.

So it is possible to put graphics into a LaTeX document, but you may have to consult the local expert to be sure how it's done!