Scientific publishing with pdfLaTeX

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In many areas of science, 20–60% and even more authors are applying LaTeX when submitting their manuscripts for publication in scientific magazines, journals or book series. We therefore suggest that scientific publishers should apply LaTeX with pdfTeX for

1. composing, editing and formatting articles in any required document class and lay-out;
2. making use of the easy conversion to PDF for mailing, proof-reading or uploading purposes;
3. taking advantage of PDF for e-publication on the web and CD, as well as for printing on paper by the print-on-demand or the computer-to-plate technologies of digital printing.

All these advantages of LaTeX+pdfTeX, from manuscript submission to final production of a journal or a book, are demonstrated here with examples from the scientific publications produced by the non-profit publishing house "Copernicus".

Typesetting nightmares

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It does not take much for users (and customers) to realize that TeX is a programming language. This often results in the perception that you can do anything you want, and make people believe that you can do better than other, less open applications. Combine this with the fact that developers seldom admit that something cannot be done, and the ingredients of a typographic programming nightmare are present.

The complication arises from the facts that:

- opposite to desktop publishing applications, TeX sees a document as a sequence of content
- where TeX-based macro packages tend to organize fonts and measures, designers follow a more random path
- where TeX loves structure, authors want to put any thought on paper, being structured or not, which results in not only interfering data, but also in the wish to escape from TeX's machinery
- one reason for choosing TeX is its ability to typeset math, and typesetting that often conflicts with pure text typesetting
- TeX tries to do its best to typeset beautiful paragraphs, but frequently a (not producible by TeX) alternative is considered more beautiful or adequate

This means that in order to fulfill the needs of authors and designers, one sometimes has to bend TeX's rules and cook up rather complicated macros. In this presentation I will discuss a couple of last year's (typo-)graphical programming nightmares.

LaTeX in real-world math typesetting: NFSS vs. NFNF

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The New Font Selection Scheme (NFSS) in LaTeX enabled much more flexible managing of fonts. Handling of math fonts and text fragments within math was also enhanced. However, the available choice of math fonts is too limited to satisfy standard requirements of many major scientific publishers to set math in virtually arbitrary fonts.

To meet such requirements for typesetting a number of major journals and a considerable number of books that are heavy in math (from the point of view of typesetting), we developed a strategy of attacking the problem from two sides at the same time. A new font-loading scheme, based on NFSS, is employed in conjunction with custom-adapted math fonts. Within math, the main focus is on fonts intended to play the role of the `cmmi*` fonts from the Computer Modern family (italic variables plus Greek). Extensive work on kerning and spacing, as well as enriching the math font families available, was the key to allow complex math formulas to be typeset easily in various font styles and to look good.

An additional twist comes from the common requirement for special styles in section titles, table- and figure captions, table body, abstract, etc. A typical example is to require the abstract to be all bold, section titles to be bold sans-serif, whereas table- and figure captions should be sans-serif bold-condensed. All of those elements can contain formulas. Setting math in such circumstances can be tricky. We show that our font scheme, combined with a satisfactory solution to NFNF (**N**eed **F**or **N**ew **F**onts) can successfully accomplish the tasks.

A number of samples illustrate this font system at work. We show a number of other enhancements within this system, both on the font-loading side and in the fonts themselves. Some other real-life situations in math typesetting that tend to be neglected in academic discussions are also presented.

Using TeX to manage IT for a mathematics congress

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Just prior to this TUG conference, the ICIAM 2003 congress was held. This was a major international congress attracting ≈ 2000 delegates from all branches of mathematics — mainly applied, but a good deal of pure mathematics was also represented.

As the author was responsible for the information technology aspects of this congress, TeX-related software served a major role throughout. It was used, for example, with

- design and production of the congress web-site;
- publicity pages for the invited speakers;
- the abstract-submission process;
- online display of abstracts, in HTML and PDF;
- printed book of abstracts, program and speaker/subject listings;
- conference volume, with full papers from the invited speakers;
- slides of abstracts for all talks and minisymposia;
- conference CD, with the above items in both HTML and fully-linked/bookmarked PDF.

In this talk we will look at some of this material and discuss the TeXniques used in its production and maintenance over more than 2 years leading up to the congress itself. This will include aspects relevant to LaTeX, pdfTeX, LaTeX2HTML, MathML, and CGI scripting for web pages.