REVTEX version 4.0, an authoring package by the American Physical Society

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Abstract

The American Physical Society has just released a new version of their REVTEX authoring package, REVTEX version 4.0. The `revtex4` document class for LATEX2e is completely new code, not a rewrite of REVTEX version 3.1. Those preparing electronic submissions to APS journals, like Physical Review, to American Institute of Physics journals, or to Optical Society of America journals will use `revtex4`, available via http://publish.aps.org/revtex4 as well as on CTAN.

Other journals and societies may create their own plug-in customizations of REVTEX, as has been done by, e.g., the Optical Society of America.

Introduction

The `revtex4` document class allows you to prepare a LATEX document suitable for electronic submission to any journal of the American Physical Society, or any journal of a participating society.

The formatting details connected with a particular target journal are entirely taken care of by a single document class option, the *journal substyle*. For example, a submission to Physical Review Letters would contain the simple statement:
`\documentclass[prl]{revtex4}`

If instead targetting the Reviews of Modern Physics, `prl` is changed to `rmp`, without further alteration. Within the document itself, the syntax is unaltered.

REVTEX therefore establishes a single set of markup that can be used for any of a large and growing number of journals in their electronic submissions programs. In the APS, REVTEX documents are destined for conversion to SGML, a purely descriptive markup scheme, therefore them emphasis is on LATEX documents that avoid procedural markup.

The `revtex4` document class is modeled after LATEX's `classes.dtx`-based document classes, thus writers familiar with LATEX's `article` class will find it easy to adopt REVTEX.

However, REVTEX has additional descriptive markup tools allowing for better structuring of the information on the title page, in the document body, and within the bibliography. It also has options to conveniently compose the material in a format similar to that of the target journal.

Availability and installation

REVTEX is distributed in ready-to-install form, has complete source with prebuilt documentation, and includes with user documentation and sample files. Its distribution point is http://publish.aps.org/revtex4 and it also appears on the Comprehensive TEX Archive Network (http://tug.org) in the directory tex-archive/macros/latex/contrib/supported/revtex. It is available under the LATEX Project Public License (LPPL).

Installation is simple if your TEX system uses the TEX Directory Structure: REVTEX files are installed in just two locations:

- Macros in `texmf/tex/latex/revtex4`, and
- BIBTEX styles in `texmf/bibtex/bst/revtex4`

Relationship to REVTEX 3

The `revtex4` document class for LATEX2e carries almost the entire feature set of the outdated REVTEX 3.1 (which was a LATEX 2.09 style), with greater convenience and considerably more powerful formatting. All of the special characters accessible with version 3 have been retained, along with special features, like tables that can break over pages.

Compatability with LATEX packages

REVTEX is compatible with the American Mathematical Society 2.0 packages `amsfonts`, `amssymb`, and `amsmath`.

REVTEX is compatible with the LATEX required packages `array`, `dcolumn`, `graphics`, and `graphicx`,

as well as such popular LaTeX extensions as `url` and `hyperref`.

Other well-behaved LaTeX packages are likely to be compatible with `revtex4`. However, compatability will be problematic with packages that extend LaTeX in ways already provided for by REVTeX.

REVTeX is *not* compatible with the packages `multicol`, `cite`, `endfloat`, and `float`.

REVTeX is compatable with the `longtable` package, and besides repairing some of that venerable package's bugs, extends it to work properly in a two-column page layout: you can create tables that break over columns if need be.

Extra convenience in formatting

Title page information, in the past restricted to, e.g., `\title`, `\author`, and `\thanks`, now accomodate in a descriptive way all of the required features of academic journals, such as `\collaboration`, `\email`, `\altaffiliation`, `\homepage`, and `\affiliation`. This novel feature originated with David P. Carlisle.

The `revtex4` class is capable of all of the features of LaTeX's `twocolumn` option, but additionally allows switching to- or from a one-column page layout anywhere on the page. There is an environment, `\begin{widetext}`, expressly for the purpose of presenting extra-wide math displays that interrupt a two-column layout.

A number of bugs in LaTeX have been fixed, among them the infamous `\begin{eqnarray}` spacing problem.

Patrick Daly's `natbib` package is always loaded by `revtex4`, and his `custom-bib` package has been used in the preparation of BibTeX styles for APS journals. If you have been using BibTeX or `natbib`, you will find REVTeX a familiar environment.

Power under the hood

The `revtex4` class incorporates two new extensions to the LaTeX kernel, `ltxutil` and `ltxgrid`, which are available separately for public use under the LPPL. The latter package, based on the work of William E. Baxter, provides a completely rewritten output routine for LaTeX, one that has far fewer limitations, and which fixes many of LaTeX's bugs.

Adaptability

The `revtex4` class's use extends far beyond APS and OSA journals; participants in our beta testing program have employed it for submissions to other journals and for the production of monographs, conference proceedings, and more. Also, the `revtex4` document class provides an extensible architecture for other societies and journals to use: all of its APS-specific features are collected into a "sub-package", called `aps.rtx`. Anyone wishing to customize `revtex4` to their own journal is encouraged to write their own `.rtx` file.

Class options

The document class options of REVTeX are organized into three categories.

Society and Journal substyles An option such as `prl` specifies the target journal of your document. For most purposes, specifying the journal is sufficient, with no other options needed. At present `revtex4` has about a dozen journal substyles.

Processing options REVTeX's option `preprint` declares that the document should be formatted appropriate to copyediting, with generous leading, larger fonts, and wide margins. An alternative, `twocolumn`, implies closer adherence to the journal's typeset appearance. Another, `lengthcheck`, attempts an even closer adherence, to the point of allowing you to make a good prediction of the number of pages for the published article.

Simple options The option `bibnotes` specifies that title block notes (otherwise formatted as footnotes on the title page) are to appear within the bibliography, a choice common in APS journals. This option is *simple* in that it controls a single aspect of document processing.

Other simple options include `footinbib`, which directs footnotes into the bibliography, `endfloats`, which collects figures and tables at the end of the document (a format used in older preprint styles),

A large set of options exerts control over the way the title block is formatted. For instance, the `groupedaddress` option collects authors above a common affiliation set; alternatively `superscriptaddress` lists each individual affiliation just once, and ties an author to her related set of affiliations with a set of numerical superscripts, a format common in APS journals. There are several dozen simple options in `revtex4`.

In summary, a processing option will effectively invoke multiple simple options, and a journal substyle will invoke a set of such options appropriate to the target journal.

Specifying the title page

After the `\begin{document}` statement, a simple document would have a set of title block statements like:

```
\title{My paper}
\author{Me}
\affiliation{%
 Domain University\\
```

```
 Somewhere, US
}
```

A more complex author list would have one or more `\author` statements followed by one or more `\affiliation` statements:

```
\title{My paper}
\author{You}
\author{Me}
\author{Her}
\affiliation{Here}
\affiliation{There}
\affiliation{Everywhere}
```

This can be thought of as an author group: an affiliation set with a related author list. (An author lacking an affiliation would be followed by a `\noaffiliation` statement.)

An even more complex author list would have multiple author groups, and it is not uncommon for a particular affiliation to appear in more than a single author group. (In `revtex4` it is essential that each `\affiliation` statement for a particular institution to be the same in each instance!)

Furthermore, an author, title, or the first instance of an `\affiliation` may be followed by an arbitrary set of `\homepage`, `\email`, `\thanks`, or `\altaffiliation` statements, e.g.,

```
\author{Me}
\altaffiliation{Here}
\email{Me@hereur.edu}%
```

This markup scheme promises to encompass any sort of author list a journal might practically encounter, while still allowing the title block to be formatted using either the `groupedaddress` or the `superscriptaddress` form. It will be interesting to see if this promise is fulfilled.

Access to special features

More robust handling of floats An aggravating problem not uncommonly encountered by LaTeX users is the situation where an overly tall figure or table fails to be placed until the end of the document, effectively carrying with it all following floats of the same kind. I call such a situation a *stuck float*. Thanks to the low-level procedures of the `ltxgrid` component of `revtex4`, this state can be detected and emergency action taken. The `floatfix` class option enables this emergency processing.

A second, related disaster is heralded by the LaTeX message "Too many unprocessed floats". This situation readily occurs when a document is thick with figures or tables: LaTeX's queue of float registers fills up before any can be placed. Here, too, `floatfix` enables emergency processing that, at the very least, allows TeX to complete the typesetting of your document without halting.

Both of these features are available to any document class that incorporates `ltxgrid`, as `revtex4` does.

Switching between page layouts The `ltxgrid` package allows one to interrupt a two-column page with full-page-width material, without starting a new page. Likewise, a two-column page layout may be begun on a page with existing full-page-width material. (These features, not available in LaTeX, will be familiar to users of the `multicol` package.)

Markup that invokes this process is not at all descriptive, so REVTEX avoids the mistake of packaging this capability up as a LaTeX environment. Instead, the low-level tools are invoked by descriptive markup elements, for instance, `\begin{bibliography}`. Nonetheless, two commands are made available to the user, to allow access to the functionality in case of need. The `\twocolumngrid` command begins a two-column page layout, the `\onecolumngrid` command returns to a full-page-width layout.

Provenance

The `revtex4` document class is the responsibility of the American Physical Society's Mark Doyle. Under contract to the APS, the first draft was written by David P. Carlisle, with continued development by the author. The APS also supports the work of Patrick Daly, depending as it does on `natbib` and `custom-bib`.

The APS is firmly committed to `revtex4`'s utility as a convenient way to compose electronic submissions for its journals and those of other societies. In addition, `revtex4` is intended to serve as a effective vehicle for other projects that users may conceive, with an emphasis on compatability with LaTeX and extensions thereto, and on support for descriptive markup, hypertext, and multipurposing.

Bugs and problems can be reported to revtex@aps.org. Any incompatibility with a package declared to be compatible with `revtex4` will receive priority attention.

The future

Plans for `revtex4` include further modularization, splitting out its author/affiliation procedures as a LaTeX packge, and extending its ability to format journal pages so that it can be used to prepare APS journal articles for delivery over the internet.

I hope that `revtex4` fits into your future plans, either as an authoring tool, or as a platform for your society's journals.