What Is New in LaTeX? III. Formatting References

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Dedicated to the Memory of Michael Downes

Photo credit: Alan Wetmore.

Oxford, 2000.

And the Evening and the Morning Were the Fifth Day

Having created TeX for himself and other knowledgeable users, Donald Knuth eagerly awaited convenient work environments to be built, more suitable for the average user to work with. Two such platforms emerged in the early 1980s: $\mathcal{AMS}$-TeX by the AMS (with Michael Spivak in charge) and LaTeX by Leslie Lamport.

$\mathcal{AMS}$-TeX provided many features needed by the mathematical community, including

- Sophisticated math typesetting capabilities complete with the formatting of multiline formulas
- Flexible bibliographic references

LaTeX also provided many features, including

- The use of logical units to separate the logical and the visual design of an article
- Automatic numbering and symbolic cross-referencing

Both $\mathcal{AMS}$-TeX and LaTeX became very popular, causing a split in the mathematical community, as some chose one system over the other.

In February of 1995 the AMS released version 1.2 of $\mathcal{AMS}$-LaTeX built on top of the newly redesigned LaTeX. **Michael Downes** was the project leader.

How to Format References

LaTeX's approach was simple: "hardwire" the references, format each one separately. So a typical reference

> [3] Ernest T. Moynahan, *On a problem of M. Stone*, Acta Math. Acad. Sci. Hungar. **8** (1957), 455–460.

would appear in the LaTeX source of the references, for instance, as

```
\bibitem{eM57}
Ernest~T. Moynahan, \emph{On a problem
of M. Stone}, Acta Math. Acad. Sci.
Hungar. \textbf{8} (1957), 455--460.
```

Of course, LaTeX users were free to use `bibtex`. In a `bibtex` database, the above reference would be coded, for instance, as

```
@ARTICLE(eM57,
   author = "Ernest T. Moynahan",
   title = "On a Problem of
           {M. Stone}",
   journal = "Acta Math. Acad. Sci.
             Hungar.",
```

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```
   pages = "455--460",
   volume = 8,
   year = 1957,
)
```

In the new LaTeX with the amsmath package, of course, you can still "hardwire" a reference or use bibtex. Unfortunately, the flexible bibliographic references of $\mathcal{AMS}$-TeX were dropped.

Michael told me that one of the difficulties in coding the bibliographic commands for $\mathcal{AMS}$-TeX was to find where a reference stops and the next one starts. In the new LaTeX setup, each reference would become an environment, so this difficulty would not arise. Little did I know that Michael had plans far more ambitious than recoding the amsmath reference formatting commands.

We talked about implementing formatted references as an AMS package on and off for quite a few years. In the late 1990s, I received the good news: Michael got the green light to proceed with the project.

The AMS released amsrefs at its annual meeting in January 2002. (After Michael Downes passed away, David M. Jones took over the project, and released version 2.0 in June 2004. The current version is 2.03.) The presentation was made by Michael Downes, who designed and coded the package. I was very excited to hear his lecture—bibliographic management was the last block needed to complete the rebuilding of LaTeX.

My excitement was shared by Michael and by very few others. Two minutes before the start of the presentation, there were only the two of us in the lecture hall.

Michael's Vision

Michael combined the best of both worlds:

(1) An amsrefs entry is very much like a bibtex entry. For instance, the above entry in amsrefs form is

```
\bib{eM57}{article}{
author={Moynahan, Ernest~T.},
title={On a problem of M. Stone},
journal={Acta Math. Acad. Sci.
        Hungar.},
volume={8},
date={1957},
pages={455--460},
}
```

(2) The bibliographic entries could be placed into the document, in a separate (LaTeX) document, in an amsrefs database (a LaTeX document), or in a bibtex database.

(3) The entries are put together and shaped by a bibliography style file. Developing a format for a journal is very easy. For instance, to format an article as above, you specify

```
\BibSpec{article}{%
+{}{\PrintAuthors} {author}
+{,}{ \textit} {title}
+{,}{ } {journal}
+{}{ \textbf} {volume}
+{}{ \parenthesize} {date}
+{,}{ } {pages}
}
```

To write a bibtex style file, you have to learn an esoteric programming language. Michael's style files are LaTeX files, and they can be written in a few minutes.

(4) The bibliographic data files are also LaTeX files, so you can print them within LaTeX, making it easy to maintain them.

(5) amsrefs allows you to use your bibtex database files seamlessly.

Real Nice Features

Citation labels: By default, the items in your bibliography are numbered. Four other label styles are supported:

- **alphabetic:** First letter(s) of each author name with the year of publication (two digits).
- **shortalphabetic:** First letter(s) of each author name.
- **author-year:** The popular author-year format, as described in *The Chicago Manual of Style*.
- **y2k:** Same as alphabetic, but with four-digit year.

Section title for a bibliography: The bibliography is in the bibdiv environment, which formats it as a section or as a chapter, as appropriate. Three more commands are provided for maximum flexibility: \bibdiv, \bibsection, \bibchapter.

Elegant handling of names: Since you input names in the form

von Lastname, Firstname, Jr.

most name related complications of bibtex disappear. You are also free to use most accents and special characters. The initials option uses initials for first names.

Citing: The LaTeX \cite command does not properly function if citations are grouped together. So now amsrefs recommends that the \cite command be used only for single citations (such as [13] or [13, Theorem 9]) and it provides the \citelist command that can easily and logically produce grouped citations, such as [12, page 9; 14; 19, Theorem 8]. For author-year citations, there are many complications that the LaTeX \cite command cannot handle. Is the author part of the sentence or part

of the reference? A few new variants of `\cite` handle this problem elegantly.

Abbreviations: can be provided for names, journals, and publishers.

This is just a sampler to whet your appetite. For a complete listing of all the features, see the two manuals in the references.

Mathematical Bibliographic Databases

You can easily build your own `amsrefs` mathematical databases with MathSciNet from the AMS. Do a search. When the result page comes up, go to the pulldown menu next to `Batch Download` and select `Citations (AMSRefs)`. Now you can checkmark the items you want by clicking on the little squares and then click on `Retrieve Marked` next to the pulldown menu or click on `Retrieve First 50`. For the latter to work well, before your search, click on the `Preferences` button and click on the circle next to `50`, so you get at most 50 items per result page. The `Retrieve First 50` then retrieves them all.

Of course, if you select `Citations (BibTeX)`, you get the references in `bibtex` format.

Transition

Mathematicians are a conservative lot. $\mathcal{AMS}$-TEX was superseded by the new LATEX with the AMS packages almost twenty years ago, and still many authors use it. How long would it take for `amsrefs` to be adopted by the majority of mathematicians, journals, and publishers?

Although the third edition of my LATEX book was out less than two years, to help in the transition, with Michael's encouragement, I started to write a brand new chapter on `amsrefs` for the next edition; see `http://www.maths.umanitoba.ca/homepages/gratzer.html/amsrefs.pdf`. This was fun, and a systematic way to find a lot of bugs.

Then a serious obstacle emerged in the transition plans.

`bibtex` produces from the database file(s) the `bbl` file, the LATEX source file for the bibliography. You can copy and paste it into your article for submission. If you need a different format, you just change the name of the style file and run `bibtex` again.

`amsrefs` also creates a `bbl` file (entirely incompatible with the `bibtex bbl` file), which it uses to create the typeset file. So if the journal you want to submit your article to does not have an `amsrefs` style file, then you have to redo the `amsrefs` entries by hand in the format the journal would accept, a major—and very unpleasant—undertaking.

So who should build an `amsrefs` database? Since only the AMS journals have `amsrefs` style files, only those should do it who know that they intend to submit to an AMS journal and *know that their article will be accepted for publication,* a tall order.

When I first called Michael with this problem, he suggested that I call back the next day; he wanted to think this problem over. Next day he started out by saying that the evening before he started coding the option to produce a LATEX source file for the bibliography. He said this was a chicken and egg problem. Journals will not produce `amsrefs` style files unless many contributors demand it, but mathematicians will be reluctant to use `amsrefs` unless many journals can accommodate it. This option will allow the use of `amsrefs`, while the journals ready their style files.

We continued the debugging process and Michael was telling me that the option was being thought through. Soon he was on sick leave, and we never talked again.

Where Are You Going, and What Do You Wish?

I think `amsrefs` is the nicest reference formatting tool ever devised for LATEX. After twenty years, the mathematical community deserves to complete the transition from $\mathcal{AMS}$-TEX to the new LATEX and the AMS packages.

To facilitate the transition, to help the mathematical community, and to respect Michael's memory, the AMS should complete the work on the option Michael started coding.

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References

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