Electronic Mathematics Journals

Mark Steinberger

John Franks, in the November 1993 Forum section of the *Notices of the American Mathematical Society* [1], stressed the advantages of nonprofit electronic journals as a vehicle for mathematical research. Since then, we have begun publication of the *New York Journal of Mathematics*, the first electronic general mathematics journal. We agree with John Franks.

The primary advantage for most mathematicians is ease of access. Without leaving one's desk, one may browse the articles and print out any articles deserving of more detailed consideration.

From the standpoint of the author, the delays in publication can be confined to the refereeing process, with approved articles appearing shortly after the peer-reviewing process is complete.

From an institutional point of view, there is a big financial advantage in promoting nonprofit electronic publications. The cost of producing, distributing, and archiving an electronic journal is smaller than that for a print journal (cf. [2, 3]. The amount of savings available through electronic publishing has been debated, but all commentators seem to agree the costs are significantly lower.) In a time of declining resources and escalating prices for print journals, this is an important advantage.

There are also additional capabilities available with electronic media. (See section "Electronic Features and Enhancements" for details, including information regarding the implementation of these capabilities in the *New York Journal of Mathematics*.) For instance, abstracts may be distributed over mailing lists, notifying the reader of the availability of the articles. Electronic links may be made to past and future papers, reviews, comments, and elucidations of the work in question. And keyword searches may be made to identify articles of interest to researchers. These capabilities vastly increase the ability of the author and the journal to provide information to the reader.

At the *New York Journal of Mathematics*, we are in the process of working out the practical side of the issues surrounding electronic publication. We understand that the formats and functions of electronic journals will evolve over time. We feel it is essential that this evolution take place in a manner that will maximize quality and work to the maximum benefit of the mathematical community.

Editorial Issues

We feel the quality of the mathematics in our articles is of utmost importance. We have implemented the traditional peer-review process in its full rigor. Papers are blind-refereed for quality and correctness, as is done for high-quality print journals.

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From the standpoint of the issues surrounding electronic publication, we have taken the following considerations to be fundamental.

- The appearance of every paper printed out from our journal should be uniform and appealing.

Thus, we decided not to distribute ASCII source files but to distribute our papers in graphical formats only. The papers are typeset in a traditional format, in accordance with the journal's style sheet, and with the logo, the statement of copyright, ISSN, and pagination given on the first page.

- The standards for succinctness in writing should be consonant with those applied by the other journals in the field.

Some proponents of electronic publication have urged changes in style, citing the low price of disk space as a rationale for publishing articles more loquacious than those commonly acceptable in a print medium. We decided to eschew this route, on the grounds that the perceived quality of our publications would be reduced. We feel it is important to follow the standards of consensus in the field. If these standards change in the future, we will change with them.

Authors who wish to expand on the material in greater detail than the editor feels is appropriate for a journal article are welcome to submit additional material for inclusion in hypertext comment files (see below).

- The written record must be maintained intact in perpetuity.

The University at Albany, State University of New York, has endorsed this commitment, agreeing to insure the integrity of the journal's archive in perpetuity. Our articles are fixed at time of publication, with their pages numbered consecutively throughout each volume in the traditional manner.

These decisions have affected some of our further options while leaving others open.

Most prominently, the decision not to distribute ASCII source files has made distribution by e-mail impractical. Our papers are available through Internet tools such as FTP, Gopher, and the World Wide Web (WWW).

Electronic Features and Enhancements

Client and Server Technologies

As is indicated by the variety of the Internet tools in use, Internet technology is a moving target, and electronic journals must move with it. In particular, the journals must provide service to accommodate the technologies used by the various users.

FTP and Gopher were developed earlier than WWW, and software for accessing materials served by FTP and Gopher is still more common (but not by much) than software for accessing materials over the World Wide Web. However, the capabilities of the Web are greater, as its servers and clients can communicate via *hypertext*, a system in which access to files is controlled by electronic links embedded in text files.

This provides a distinct advantage over the preexisting technologies, which basically provide access to directories of files. With hypertext, one may offer the reader a direct link to another resource anywhere on the Internet from any point in the file currently being accessed. By activating the link, the reader is given immediate access to the resource in question and may return to precisely the same location in the preceding document with a keystroke or the click of a button. This makes cross-referencing very flexible and effective, increasing considerably the efficiency of searching out information.

It is also useful to be able to decouple the presentation of information from a hierarchical, tree-like structure and to allow authors and publishers to connect material as dictated by its internal logic.

Hypertext Features Useful in Electronic Journals

Hypertext is particularly well adapted to cross-references between papers or between papers and reviews and other discussions. And those journals offered via the World Wide Web can take advantage of this.

At the simplest level of implementation, each paper can have a bibliography file containing links to any item in the paper's bibliography available on the Net. And comment files are especially suited to hypertext format.

Comment files are an important innovation available to electronic journals. Maintained by the editor, they may include links to reviews, to subsequent articles in which the results are extended or applied, to errata, to elucidations by the author of material in the paper, etc. Using hypertext, such files can be structured as narratives together with links to the resources they reference.

Note that the involvement of the editor in screening the material to be placed in the comment file is a useful filter against clutter in the literature. Indeed, while the *New York Journal* has advertised its intention to provide such files, we have not yet received submissions for them.

An additional level of connectedness is given by the advent of reviewing journals on the World Wide Web. Both *Math Reviews* and *Zentralblatt* are soon to be offered on the Web. In the case of *Math Reviews*, the reviews will include direct

links to papers offered by electronic journals as well as numerous internal links to other reviews. Hopefully, it will also be possible to make links from comment files in electronic journals to reviews in the reviewing journals.

This opens up a very interesting prospect, whereby it is possible to follow an idea through several different papers and reviews via seamless, near-instantaneous linkages without ever getting up from one's desk. This is likely to be a great boon for scholarship.

Embedding Hypertext Links Directly in Journal Articles

Just as hypertext itself is more flexible and useful than offering simple directories of files, it is much more useful to be able to embed hypertext links directly in the graphical formats of the papers themselves rather than restricting them to auxiliary files associated to the papers.

The technology to do this in TeX documents is now becoming available through the Hyper-TeX project, an offshoot of Paul Ginsparg's e-print server project at Los Alamos National Labs.

HyperTeX provides a method of embedding hypertext links directly in DVI files, PostScript files, or Acrobat's PDF files. These links can be followed if you make use of a viewer programmed to recognize and follow them. Such viewers are either available or about to become available on all major computing platforms. The interested reader may find out more about this project from the following locations on the World Wide Web:

```
http://nyjm.albany.edu:8000/
hyper.html
http://math.albany.edu:8800/
hm/ht/
```

HyperTeX links have another benefit: internal cross-references. Links for the internal cross-references in a paper allow the reader to quickly flip to the statement of a theorem when it is invoked, supplying the information needed to understand an argument. Then, with a keystroke, the reader may flip back to the argument and continue reading. The process is much faster than flipping pages in a paper copy of the article, giving a real advantage to reading with a TeX viewer.

And a table of contents for the article, including links to the various sections, is quite useful for browsing.

The *New York Journal of Mathematics* offers HyperTeX DVI files for all papers published since March 1995.

Keyword Searching

Through a technique called WAIS indexing, it is possible to build databases of text from Internet sites and to run keyword searches of those databases. This can be set up to produce elec-

tronic links to those documents that match the keywords.

It is also possible to index the full TeX source of articles and then pass links either to graphical formats or to a "home page" for the paper when a match occurs. The home page can contain links to various graphical formats. Such a schema has been implemented for the *New York Journal of Mathematics* at

```
http://nyjm.albany.edu:8000/SF
/nyjmsearch.html
```

In the *New York Journal*, a paper's home page is a WWW page containing the paper's abstract, keywords, and subject classification along with various links.

While WAIS technology is useful for searching a particular Internet site, it can be even more useful to search an index of many different sites. Such an index exists in Australia: Jim Richardson's MathSearch index, at

```
http://ms.maths.usyd.edu.au:
8000/ MathSearch.html
```

It indexes all the major mathematical sites on the Web worldwide. A keyword search on this database can turn up links to resources at sites one didn't even know existed.

Direct Communication to the Readers

Electronic communication permits direct distribution of abstracts through electronic mail to interested readers. This notifies the reader of the existence of a paper and permits him or her to fetch the full paper if interested.

The *New York Journal of Mathematics* maintains four listserv lists for this purpose, running on `listserv@albany.edu`. One list, nyjmth-a, distributes abstracts for all papers. The other three are specialty lists distributing abstracts in algebra, analysis, and geometry/topology. Their list names are nyjm-alg, nyjm-an, and nyjm-top, respectively.

In future, it should be possible to design systems tailored more precisely to the specific interests of the readers. For instance, readers could be sent abstracts of all papers containing reader-specified subject classification numbers in the author's list of primary and secondary subject classifications.

The *New York Journal of Mathematics*

The *New York Journal of Mathematics* was launched with the support and assistance of the Office of Information Systems and Technology of the University at Albany, State University of New York. We also have ongoing support from the Office of the Vice President for Research and the Department of Mathematics and Statistics.

The Office of Information Systems and Technology includes both the University Libraries

and Computing and Network Services. These two units have collaborated in sponsoring the University's Electronic Library Initiative. The journal itself is part of this initiative.

The journal is integrated with the library system, and professional librarians have been active in every phase of the journal's development, including the provisions for the preservation of the data and the maintenance of the integrity of the archive. Indeed, the *New York Journal* complies with the recommendations given in [4].

The *New York Journal of Mathematics* is available by WWW, Gopher, and FTP. WWW access is given by

```
http://nyjm.albany.edu:8000/
nyjm.html
```

while Gopher access is given by the command

```
gopher nyjm.albany.edu 1070
```

The same archive is accessible by anonymous FTP on `nyjm.albany.edu` in the directory /pub/nyjm.

Papers should be submitted by electronic mail directly to the editor whose field is closest to the work in question. Our editorial board is listed at
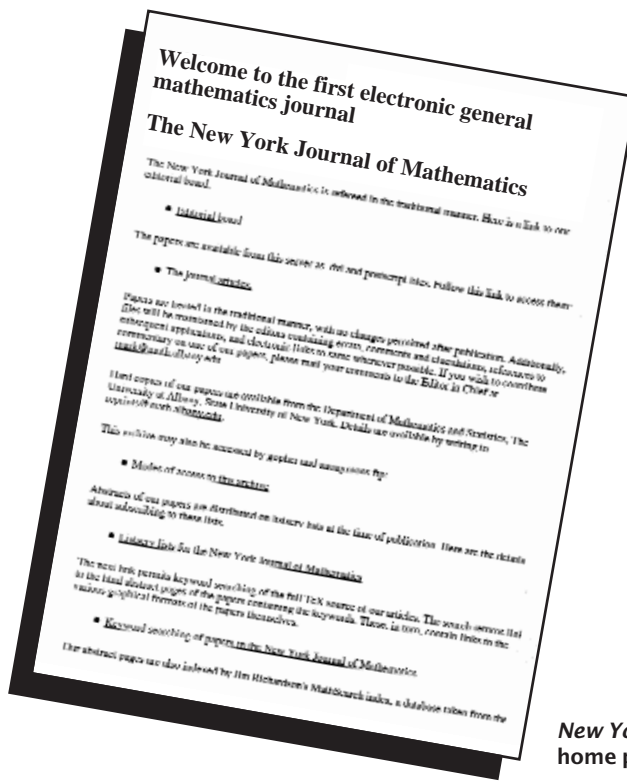
```
http://nyjm.albany.edu:8000/
Edboard.html
```

Instructions for the preparation of articles may be found at

```
http://nyjm.albany.edu:8000/
Instr.html
```

Our papers are provided over the Internet free of charge. Printed copies may be obtained for a fee from the Department of Mathematics and Statistics of the University at Albany, State University of New York.

References

[1] JOHN FRANKS, *The impact of electronic publishing on scholarly journals*, Notices Amer. Math. Soc. **40** (1993), 1200–1202.

[2] ANDREW ODLYZKO, *Tragic loss or good riddance? The impending demise of traditional scholarly journals*, Notices Amer. Math. Soc. **42** (1995), 49–53.

[3] FRANK QUINN, *Roadkill on the electronic highway? The threat to the mathematical literature*, Notices Amer. Math. Soc. **42** (1995), 53–56.

[4] ____, *A role for libraries in electronic publishing*, EJournal **4** No. 2 (June 1992).

New York Journal of Mathematics
home page