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# A Strategy for Electronic Dissemination of NASA Langley Technical Publications

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# A Strategy for Electronic Dissemination of NASA Langley Technical Publications

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## **Executive Summary**

The National Aeronautics and Space Act of 1958 directs NASA to "provide for the widest practicable and appropriate dissemination of information concerning its activities and the results thereof." The recent proliferation of Internet access and widespread information distribution capability allows NASA to more effectively meet this directive. To this end, the Electronic Dissemination of Technical Reports (EDTR) working group was formed by the Office of the Chief Scientist at Langley Research Center in September 1993. The EDTR working group was chartered to establish the capability of electronically disseminating NASA Langley's technical reports to the U.S. aerospace industry.

#### **External Survey**

During September 1993, the EDTR working group and employees from the Langley Scientific and Technical Information Division (STID) visited a representative sample of aerospace companies to ascertain their evaluation of NASA STI services and products and, in particular, their reaction to the possibility of electronic dissemination of Langley reports. This group met not only with the library staff but also with the research and engineering staff of each company. The five companies visited were Boeing Aerospace Company, McDonnell Douglas, United Technologies, Texas Instruments, and Bell Helicopter. A conference meeting was also attended by representatives from seven additional companies and two universities in southern California. After evaluating the information obtained during these visits, the working group identified a number of factors for establishing the EDTR system requirements:

- 1. Because of the reliance of industry researchers on their libraries, the industry library represents a viable target for (and customer of) electronic dissemination.
- 2. Because of the lack of Internet access by aerospace industry researchers, passively publishing Langley reports on the Internet is insufficient; more proactive approaches are also required, such as electronic current awareness announcements.
- 3. Because Internet access is increasing and libraries are beginning to deliver electronic products to their customers, interest among industry researchers in on-line products is expected to increase.
- 4. Because industry systems and network environments differ from Langley's, the EDTR system should not be modeled according to the Langley environment.
- 5. Any proposed EDTR system must significantly exceed the current capabilities of traditional NASA STI products and services, which typically do not sufficiently reach industry.
- 6. Electronic access and delivery of Langley reports must include basic printing and searching capabilities.
- 7. Timeliness must be exploited in the electronic dissemination process.
- 8. When possible, data files should be included or linked to the electronic report.

#### **Internal Survey**

A desired characteristic of any electronic dissemination system is that it be capable of handling documents in the form in which they are produced, that is, without additional staffing requirements for document conversion. An informal survey was therefore performed to determine the standard word processing and graphics packages used by Langley researchers in the preparation of documents for publication. Surveys were sent to researchers in four directorates to identify first the degree to which documents were being prepared electronically and second the principal software packages used. Researchers were also asked about the method used to include graphics and photographs in their documents.

Most reports are already being generated (at least in part) electronically. If an appropriate electronic distribution system is identified, electronic posting of most technical documents may be a realizable near-term goal. However, no standard software package exists at Langley for either word processing or graphics, and manually pasting figures into documents is still prevalent. In addition to differences in software utilization, no standard platform exists for producing the documents. The EDTR group decided that it is neither appropriate nor cost-effective to define a standard set of software and compel all researchers to conform. Rather, a common output format, such as Adobe PostScript, should be sought from among the set of software; the electronic dissemination system would then only need to handle the single common output format.

#### System Selection

Seven electronic information systems in the Washington, D.C., area were investigated to gain an understanding of the available technologies and approaches used by other national agencies and corporations. This information was used to formulate a strategy for the development of the EDTR system. Three approaches are used to develop electronic information dissemination systems: (1) custom development, (2) commercial off-the-shelf software, and (3) public domain software. Custom development involves the internal staff developing the system, writing the custom code, and integrating the system. This approach for the EDTR system was considered too costly and not necessary. Most systems are developed with the various commercial off-the-shelf software packages. This approach is cost-effective in terms of the development, integration, and maintenance and also provides optimal functionality. For wide area network access, the site licensing of client software can be costly, but the vendors are willing to negotiate on a case-by-case basis. This approach was seriously considered and evaluated for the EDTR system. Public domain software for information delivery and retrieval over the Internet has proliferated and is widely use by those connected to the Internet. Overall, this approach can be cost-effective for wide access by various clients, but it may be expensive when customization and integration are required to enhance functionality. This approach was selected by the working group for the EDTR system.

#### Langley Technical Report Server

The Langley Technical Report Server (LTRS), an experimental proof-of-concept system based on World Wide Web (WWW) and Wide Area Information Server (WAIS) protocols, was in operation at the time. WWW and WAIS allow a simple model for indexing and distributing technical reports. The abstracts are indexed with WAIS, and each abstract contains a pointer to the report, which may or may not reside on the same computer as the indexed abstracts. Currently most reports are stored in PostScript format, a de facto standard used for output to printers. Supplying reports in PostScript format provides most users with the ability to download and print. The potential report user can browse the list of abstracts or search the abstracts for key words (such as subject terms, author names, report numbers). When a report of interest is identified, the author can choose the title in the abstract list and the report is downloaded to the user's workstation for viewing or printing. LTRS currently provides access to over 300 reports. During the first 18 months of operation, this server has delivered over 11,000 copies of these reports.

At Langley 33 volunteers from technical and nontechnical fields evaluated LTRS on three platforms (Macintosh, UNIX, and PC). Most volunteers thought the LTRS home page was clear and easy to understand. Most were satisfied with the searching capability, wanted to be able to search the full text of the report, and valued the browsing capability. Although they wanted to view the abstract before the full text, they liked being able to go directly to the full text of the report. For the most part, they judged the system to be valuable, even though a limited number of reports are currently available. Overall, they believed that the major strength of LTRS is that it allows researchers to access and search Langley publications from their desktop. The volunteers wanted more reports available and wanted missing figures and photographs included to complete the reports. They complained of inconsistent viewing capability. Other problems seemed to result primarily from limitations of the platform rather than LTRS (i.e., speed, memory, and disk space).

Approximately 175 U.S. companies have accessed LTRS. In addition to numerous computer and software companies, 16 aerospace companies and many nonaerospace companies who are candidates for dual use of NASA's aerospace technology have used the LTRS system. Also over 200 universities and government agencies have accessed LTRS. Although LTRS has not made great penetration into the aerospace community, it has demonstrated the capability of disseminating Langley technical reports to the aerospace industry.

#### Recommendations

Management support and guidance are essential to the success of any electronic distribution system. Thus, the EDTR working group proposed a policy statement that provides guidelines for distribution and storage as well as a framework for managing the electronic distribution system. (See appendix A.) Although it has not been adopted by Langley management, the policy statement has been reviewed for adherence to copyright law and generally conforms to NASA STI publication policy. The EDTR working group recommends a framework for managing the EDTR system based on establishment of a committee to (1) establish electronic publication standards, (2) monitor adherence to policies, (3) maintain structure of the EDTR system, (4) ensure reliability of the system, (5) plan for the future, and (6) promote the use of the EDTR system, particularly among aerospace industry.

The EDTR working group recommends that the proposed policy statement be reviewed and implemented to move EDTR from a proof of concept to an important strategic direction for the Langley STI Program. Also, the open, unrestricted EDTR system must be extended to restricted information to provide a secure way of quickly disseminating our commercially valuable information to NASA's domestic customers. However, a restricted system will entail investment in labor to qualify users and investment in systems to manage the risk of restricted information on-line. Finally the evaluation of LTRS by Langley users clearly indicated areas for improving functionality. A high priority should be enlarging the collection to include most unrestricted technical documents originating from Langley.

## Introduction

The National Aeronautics and Space Act of 1958 gives NASA the following directive for disseminating information: "The aeronautical and space activities of the United States shall be conducted so as to contribute . . . to the expansion of human knowledge of phenomena in the atmosphere and space. The Administration shall provide for the widest practicable and appropriate dissemination of information concerning its activities and the results thereof." The recent proliferation of Internet access and widespread information distribution capability allows NASA to more effectively meet this directive. To this end, the Electronic Dissemination of Technical Reports (EDTR) working group was formed by the Office of the Chief Scientist at Langley Research Center in September 1993. The EDTR working group was chartered to establish the capability of electronically disseminating NASA Langley's technical reports to the U.S. aerospace industry.

To accomplish this objective, the working group determined external customer (user) requirements, surveyed technology status, developed a vision for electronic dissemination, determined internal customer (Langley researchers) requirements and capabilities, and defined and implemented a system for electronic dissemination. The primary focus of this working group was the aerospace industry. Based upon the information gathered from external sources and from within Langley, basic and preferred requirements that described a desired report distribution method were derived. Two approaches were considered for developing a system to meet these requirements: (1) use of commercial off-theshelf software and (2) use of public domain software based on the World Wide Web (WWW) protocols (ref. 1). After evaluating the two approaches in light of the stated requirements, the WWW approach was selected by the group. The Langley Technical Report Server (LTRS), an experimental report distribution system based on WWW protocols (ref. 2), was in operation at the time.

After LTRS was selected as the primary electronic distribution system, an evaluation was held at Langley to determine how to improve the functionality of the LTRS system. This report documents the findings of the EDTR committee, including customer surveys, system analysis and selection process, current system design, LTRS system evaluation, recommended policy statement, and suggestions for future implementations. Appendix A contains the recommended policy statement, appendix B contains LTRS usage statistics, and appendix C contains the LTRS instructions that were used during the evaluations.

## **External Survey of Industry Electronic Dissemination Usage**

During September 1993, the EDTR working group and employees from the Langley Scientific and Technical Information Division (STID) visited a representative sample of aerospace companies to ascertain their evaluation of NASA scientific and technical information (STI) services and products and, in particular, their reaction to the possibility of electronic dissemination of Langley reports. This group met not only with the library staff but also with the research and engineering staff of each company. The companies visited were Boeing Aerospace Company, McDonnell Douglas, United Technologies, Texas Instruments, Loral Vought, Bell Helicopter, and Lockheed Corporation. A conference meeting was also attended by representatives from seven additional companies and two universities in southern California.

Among these companies, library and information services vary from centralized library systems, to several decentralized libraries, to minimal services. In most companies, researchers rely on libraries for searches, current awareness, and document acquisition and delivery. Many libraries provide electronic services, such as online catalogs, technical experts directories, and CD-ROM databases.

In general, aerospace companies are wary of Internet security and therefore provide electronic mail access only, restricted Internet access through a firewall, or no Internet access at all. However, Internet access is increasing. Company systems and network environments resemble Langley's in that multiplatform is the norm. Their systems and network environments differ from Langley's in that Macintosh is not as prevalent, IBM-compatible personal computers (PC's) are much more prevalent, and networks and electronic mail are more heterogeneous and may not be connected to the Internet.

The aerospace companies with viable libraries use a wide range of NASA STI products and services, including subscriptions to NASA reports, current awareness products, and NASA's aerospace database, RECON. The publication *Tech Briefs* was often mentioned. The companies generally considered NASA and NACA documents very valuable resources. However, many of these companies complained about NASA STI products (RECON) and used commercial replacements when available (Dialog and AIAA Aerospace Database). The nonaerospace company and the company with a minimal library had difficulty finding NASA documents and were generally unaware of NASA STI products. In addition, nearly no one understood or was concerned about

1.	Because of the reliance of industry researchers on their libraries, the industry library represents a viable target for (and customer of) electronic dissemination.
2.	Because of the lack of Internet access by industry researchers, passively publishing Langley reports on the Internet is insufficient; more proactive approaches are also required, such as electronic current awareness announcements.
3.	Because Internet access is increasing and libraries are beginning to deliver electronic products to their customers, interest among industry researchers in on-line products is expected to increase.
4.	Because industry systems and network environments differ from Langley's, the EDTR system should not be modeled according to the Langley environment.
5.	Any proposed EDTR system must significantly exceed the current capabilities of traditional NASA STI products and services, which typically do not sufficiently reach industry, particularly nonaerospace companies.
6.	Electronic access and delivery of Langley reports must include as a minimum basic printing and searching capabilities.
7.	Timeliness must be exploited in the electronic dissemination process.
8.	When possible, data files should be included or linked to the electronic report.

Table 1. EDTR System Considerations Inferred from Aerospace Industry Visits

distinctions among the NASA report series (i.e., TP's, TM's, etc.).

Many companies recommended improvements to NASA STI products and services such as RECON and the Center for Aerospace Information (CASI), which is under the auspices of NASA Headquarters. Companies recommended several new products, such as electronic current awareness, technical experts locator, monographs, and state-of-the-art reviews. They also recommended enhancements to our traditional reports, such as more informative abstracts and summaries.

The companies felt that NASA reports are not published and distributed quickly enough. Thus, electronic access to Langley reports is of interest to these companies provided that they can print a hard copy. They also wanted robust searching not only of bibliographic citations but also of full text of a large repository of documents, and they wanted direct electronic access to the data discussed in NASA reports.

After evaluating the information obtained during the industry visits, the working group identified a number of factors for establishing the EDTR system requirements. These system requirements are summarized in table 1.

# Internal Survey of Langley Document Preparation Methods

A desired characteristic of any electronic dissemination system is that it be capable of handling documents in the form in which they are produced, that is, without document conversion. The EDTR working group therefore performed an informal survey to determine the word processing and graphics packages used by Langley researchers in the preparation of documents for publication. Surveys were sent to researchers in four directorates to identify first the degree to which documents were being prepared electronically and second the principal software packages used. Researchers were also asked about the method used to include graphics and photographs in their documents. For expediency, the surveys were distributed via electronic mail. Surveys were also sent to branch secretaries so that researchers who do not use electronic mail could have the opportunity to respond.

Over 250 researchers from four directorates responded. Many researchers also provided detailed commentary on the report generation process along with suggestions for process improvement. Because this was an informal poll, no attempt was made to aggregate the responses weighted by directorate size; the results are presented as a proportion of those who chose to respond. Trends resulting from that survey are presented in figures 1 to 4.

The first important observation from the survey results is that most reports are already being generated (at least in part) electronically. Even when handwritten manuscripts are delivered to secretaries for typing (relatively rare among the respondents), the secretaries prepare the documents electronically. Thus, if an appropriate electronic dissemination system is identified, electronic posting of reports may be a realizable near-term goal.

Authors need only be convinced of the desirability of using the skills they already possess or using available publication support services to provide reports in a

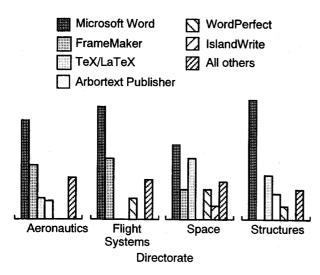


Figure 1. Usage of word processing software.

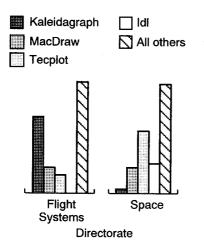


Figure 2. Usage of graphics software.

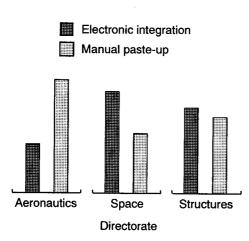


Figure 3. Figures incorporated in reports.

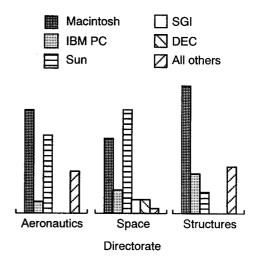


Figure 4. Usage of computer platforms.

completely electronic format. Because many journals have already imposed such a requirement, the learning curve for the complete production of electronic documents should be short.

The second important observation from the survey is that no standard software package exists for either word processing (fig. 1) or graphics (fig. 2). A large fraction of respondents use individually preferred packages, particularly for graphics. Figure 3 shows that manually pasting figures into documents is still prevalent, especially in the Aeronautics directorate, where researchers commonly paste up photographs in documents. In addition to differences in software utilization, no standard platform exists for producing the documents (fig. 4). Respondents were almost evenly split between UNIX workstations and desktop personal computers.

Researchers at Langley have diverse requirements for appropriately publishing their findings. The EDTR group decided that it is neither appropriate nor costeffective to define a standard set of software and compel all researchers to conform. Rather, a common output format such as Adobe PostScript should be sought from among the set of software; the electronic dissemination system would then only need to handle the single common output format. The disadvantage of standardizing on output format is that this format might limit the functionality of the system, such as full-text searching and hypertext.

## System Capabilities

The EDTR working group used the information from the preliminary meetings with industry and the survey of NASA Langley researchers to compile a set of basic and preferred requirements for the electronic dissemination

#### Table 2. Basic System Requirements

1.	Compatible with multiple platforms with graphical capability.
2.	Accessible on a TCP/IP Network.
3.	Able to download, view, and print documents and parts of documents including graphics with reasonable speed.
4.	Able to perform interactive searching of bibliographic citation.
5.	Able to view files with sufficient functionality to determine relevance before downloading (e.g., scrolling, zooming, rotating, go to pages).
6.	Easy to use and not require users to be familiar with complex search systems or computer software and hardware integration.
7.	Accommodate delivery of a large repository of documents, including scanned documents as well as electronic documents from various text formatting systems.
8.	Accessible to people working within a restricted access (firewall) system.
9.	Offer minimal cost and labor for NASA and customer implementation, maintenance, and growth of system.

#### Table 3. Preferred System Requirements

1.	Ability to mark text with users' annotations and bookmarks.
2.	Ability to cut and paste text and graphics.
3.	Allow an optional full-text searching of selected documents.
4.	Ability to navigate through document with hypertext and to create links between documents and files.
5.	Accommodate various information formats including nonprint information such as numeric data files, photographs, video, audio.
6.	Ability to access databases resulting from other electronic publishing projects.
7.	Flexible enough to allow database to be included in future electronic publishing projects.
8.	Accommodate regular announcements containing abstracts of newly released papers grouped by subject or RTOP category
9.	Accommodate access to and transfer of sensitive information.
10.	Inclusion of a technology locator that identifies responsible offices and principal researchers.
11.	Compatible with nongraphical platforms.

system. These requirements are presented in tables 2 and 3, respectively. The EDTR working group deemed the basic requirements to be necessary for a viable EDTR system. The preferred requirements are important but not necessary.

#### **System Selection Process**

The system selection process consisted of surveying existing information dissemination systems, evaluating two approaches against the basic and preferred requirements, and deciding which approach would be better for the electronic dissemination of technical reports to the aerospace industry.

Seven electronic information systems in the Washington, D.C., area were investigated to gain an

understanding of the available technologies and approaches used by other national agencies and corporations. This information was used to formulate a strategy for the development of the EDTR system. Systems at the following institutions were investigated:

- National Library of Medicine
- Naval Research Laboratory
- Kestrel
- · Bell Atlantic Corp.
- Symbiont
- NASA Goddard Space Flight Center
- NASA Headquarters/Info Dynamics

## **System Development Approaches**

Three major approaches are used to develop electronic information dissemination systems. These approaches are (1) custom development, (2) commercial off-the-shelf software, and (3) public domain software.

Custom development involves the internal staff developing the system, writing the custom code, and integrating the system. This approach was used for all systems at the National Library of Medicine. In general, this approach is expensive and is used when a specific application cannot be developed with existing software. In other words, the application may require so many modifications to the existing software that it is not worth the effort, or it may be virtually impossible to adapt a commercial product to work with an existing internal system. At the National Library of Medicine, this approach seems to be used because they have a 30-yearold MEDLINE system, permanent resources allocated to develop all necessary internal systems, and a philosophy that their needs are unique and will always require them to develop their own systems. This approach for the EDTR system was considered too costly and not necessary.

Most systems are developed with various commercial off-the-shelf software packages. The Projects Directorate at the NASA Goddard Space Flight Center, NASA Headquarters, the Naval Research Laboratory Library, and Bell Atlantic Information Systems have used this approach. Of all the systems that were investigated, the most successful ones in terms of meeting the original objectives used this approach. This approach is costeffective in terms of the development, integration, and maintenance and also provides optimal functionality. For wide area network access, the site licensing of client software can be costly, but the vendors are willing to negotiate on a case-by-case basis. This approach was seriously considered and evaluated for the EDTR system.

Public domain software for information delivery and retrieval over the Internet have proliferated and are widely used by those connected to the Internet. The Astrophysics Data Facility at the NASA Goddard Space Center developed a prototype system with this approach. This specific implementation did not seem to achieve its intended objectives. The reason seemed to be inexperience with selection and integration of the various hardware and software pieces. The EDTR working group realized that this prototype was not a good implementation and integration of public domain software. Overall, this approach can be effective for wide access by various clients, but it may become expensive when customization and integration are required to enhance functionality. This approach was also seriously considered and evaluated for the EDTR system.

## **Existing Langley Prototypes**

Two efforts were in progress at Langley in the area of electronic dissemination of technical reports: LTRS and FEDS. The LTRS project sponsored by the Information Systems Division and STID is based on the WWW protocols and NCSA Mosaic, a public domain WWW browser (ref. 3). The LTRS project was started as a proof-of-concept service in late 1992 (ref. 4). The other project, a prototype full-text electronic documents system (FEDS), was sponsored by STID and was initiated as a result of a grant from the Director's Discretionary Fund awarded to the Technical Library in September 1993. This project proposes use of Interleaf Worldview and commercial off-the-shelf software for the development of the system. Although both projects shared the common goal of electronic dissemination and retrieval of reports, their approaches, objectives, and developmental cycles differed significantly.

The goal of FEDS was to build a system of full-text NACA/NASA reports that exist in paper and electronic (T<sub>F</sub>X) format. Langley researchers would then have desktop access to NACA/NASA reports from all clients (PC, Macintosh, and UNIX) with excellent functionality, an easy-to-use interface, full-text searching, hyperlinks, manipulation, and printing. This project proposed a unified approach for providing access to all NASA reports regardless of their format. It also proposed to integrate full-text searching, viewing, and printing of reports with their original "look and feel." The emphasis of this project was providing desktop document delivery and retrieval to the Langley community with a high level of functionality. The prototype project was given a year for development with a projected completion date of July 1994.

The goal of LTRS was to disseminate Langley technical reports to a wide audience on the Internet. The report set was initially comprised of Langley formal technical reports from recent years that were archived in electronic ( $T_EX$ ) format (ref. 5). These reports were converted to Adobe PostScript format, but hypertext reports have since been included and other formats can easily be integrated. Based on WWW protocols, LTRS offers access from numerous platforms, even nongraphical terminals, running WWW client software such as NCSA Mosaic. LTRS offers browsing, searching of bibliographic data and abstracts, full-text viewing, and printing. The emphasis of this project was to quickly disseminate Langley technical information to a wide audience through an Internet-based solution to information delivery. LTRS has been in operation since January 1993.

#### Table 4. Evaluation of Interleaf and Mosaic

[FC, fully compliant; PC, partially compliant, NC, not compliant]

## Selection of LTRS for EDTR System

The FEDS prototype project, based on commercial off-the-shelf software, and the LTRS proof-of-concept, based on WWW public domain protocols, offered the EDTR working group the opportunity to explore two approaches to decide which approach was more suitable for the electronic dissemination of Langley's technical information. At the time of the EDTR system selection, the FEDS project was at the software selection stage prior to system development, while LTRS was already operational. Therefore, the EDTR working group focused on the functionality and suitability of the software. The group examined Interleaf Worldview and NCSA Mosaic software to determine whether they were fully compliant (FC), partially compliant (PC), or not compliant (NC) with the basic and preferred requirements listed in tables 2 and 3. The results of this evaluation are given in table 4.

Both NCSA Mosaic and Interleaf Worldview were fully compliant with most of the basic requirements and many of the preferred requirements. Thus, the working group resorted to considerations other than the system requirements in selecting a system approach. The WWW public domain approach exemplified by LTRS was selected for the following reasons:

- 1. System flexibility: LTRS is based on publicly documented open systems and standard protocols that are an intrinsic part of the Internet functionality.
- 2. Wide dissemination: LTRS is widely used (appendix B) because of availability of publicdomain client software running on numerous platforms, access to other NASA and non-NASA information from a single WWW interface, and demonstrated delivery of a wide variety of information.
- 3. Cost: LTRS imposes no direct cost for software on either NASA or its customers.

Although the commercial off-the-shelf approach had the following advantages, they were believed to be less significant to the charter of the EDTR system presented in the Introduction.

1. Functionality: Commercial software generally provides greater functionality, such as user-friendly search capabilities, full-text searching, hypertext links between search results and text.

Requirement	Interleaf	NCSA Mosaic	
Basic			
1	FC	FC	
2	FC	FC	
3	FC	FC	
4	FC	FC	
5	FC	РС	
6	FC	FC	
7	FC	FC	
8	РС	РС	
9	NC	FC	
	Preferred		
1	FC	PC	
. 2	FC	PC	
3	FC	NC	
4	FC	РС	
5	FC	FC	
6	РС	• FC	
7	PC	FC	
8	FC	FC	
9	PC	РС	
10	PC	РС	
11	FC	FC	

- 2. Software integration: Commercial document delivery systems include fully integrated client software.
- 3. Access control: Users can usually be categorized with most commercial systems to allow varying levels of access depending on sensitivity of documents.
- 4. Large collections: Commerical systems have been demonstrated on very large collections.

## **Evolution of LTRS**

### **Pre-WWW LTRS**

LTRS officially began serving reports on January 14, 1993 (ref. 4). The initial stage consisted of only one server, an anonymous FTP (file transfer protocol) server on *techreports.larc.nasa.gov*. The FTP server was the historical model for distributing reports, program codes, and other information on the Internet. Figure 5 shows the file system hierarchy for the FTP server. Initially, the reports that were available were formal technical reports in compressed PostScript format. Abstract lists, which were available in ASCII format, could be browsed or loaded into a text editor for searching.

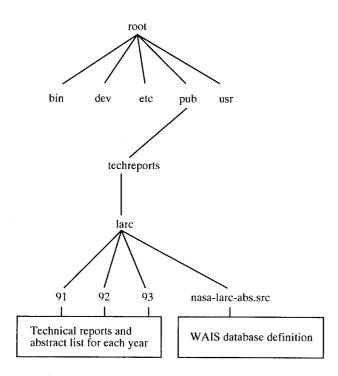


Figure 5. File hierarchy of technical reports on server.

On February 10, 1993, a Wide Area Information Server (WAIS) was added to LTRS, which allowed interactive searching of the abstracts. The FTP server and the ASCII abstract lists were still available. However, searching the abstracts and retrieving the reports were not integrated into a single process.

Many gophers (menu-based systems for exploring Internet resources) soon started to point to the FTP and WAIS servers of LTRS, but before LTRS could be implemented as a gopher server, the developers discovered NCSA Mosaic and the WWW. The gopher implementation was bypassed in favor of WWW.

## WWW Version of LTRS

The initial WWW version of LTRS began August 1993. This version consisted only of a WWW wrapper around the existing FTP and WAIS servers. The integration of WWW made the separate services easier to use and collected them into a single location for convenience; however, it did not allow for the integration of searching and retrieving.

The current WWW version of LTRS, described in detail in reference 2, made its debut in October 1993. (See fig. 6.) LTRS is now a collection of servers (Hyper-Text Transfer Protocol (HTTP), FTP, and WAIS), which are combined in a manner transparent to the user (fig. 7). Only functionality choices are presented to the user (search and browse) and the implementation details (FTP and WAIS) are hidden. Perhaps most importantly, the current version of LTRS integrates the search and retrieve functions. Users can now search the citations and abstracts of reports and then retrieve (view or save locally) the report. Also, users can now retrieve the reports directly by browsing abstract lists.

The increasingly seamless integration of new servers does not obviate the previous servers. For example, many users still access the technical reports via anonymous FTP or through a gopher gateway that points to the FTP server. The current version builds upon the prior work of the LTRS project. Even when a user accesses LTRS through WWW, a retrieval ultimately results in an anonymous FTP access to *techreports.larc.nasa.gov* for most of the reports. This orthogonal, building-block approach insures that older systems remain functional even with rapid improvements in information servers.

Although accessing LTRS via the previous methods is still possible, the use of WWW has allowed it to grow beyond the level of just serving reports from one computer. LTRS takes advantage of the distributed nature of WWW to catalog and provide access to reports that were once outside its domain. The compressed PostScript files available via anonymous FTP on techreports.larc.nasa.gov now represent only a large subset of the reports that are available.

## **Current System Design**

#### **New Model for Document Distribution**

WWW and WAIS allow a simple model for indexing and distributing technical reports. The model is general enough to be used for a variety of applications and wellsuited for the distribution of reports in a variety of formats. A small amount of metadata, in this case an abstract, is indexed with WAIS. The abstract itself holds a pointer to the report. Because WWW can point

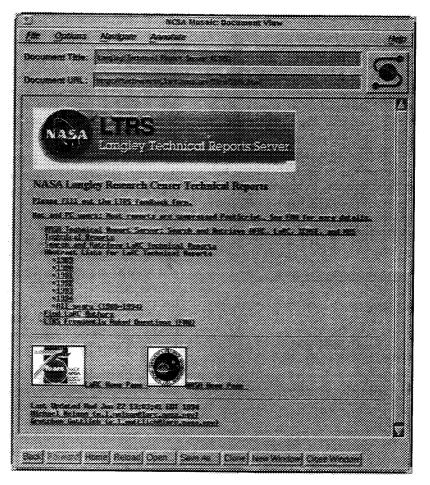


Figure 6. LTRS home page as displayed in NCSA Mosaic.

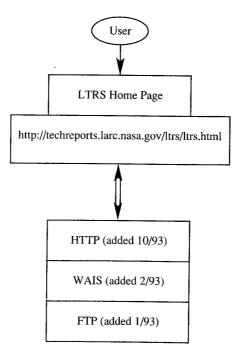


Figure 7. Collection of servers in LTRS system.

anywhere on the network, the abstract can point to a report (or other data object) residing on a different computer, possibly even with a different type of server (HTTP or gopher). Currently, the abstracts in LTRS only point to one copy of the report, but the system could easily be extended so that the abstracts point to reports in multiple formats, related reports, or even supplementary material such as photographs or video. Figure 8 illustrates a simplified view of the data model.

## **Report Storage in LTRS**

Initially, the contents of the single anonymous FTP server defined the contents of LTRS. With the use of WWW, logical content and physical content can now be separated. All abstracts for the reports are stored centrally, and while all the reports appear to be stored centrally, about 5 percent are now stored on other computers at Langley. More distributed storage of reports is anticipated in the future. However, the degree of distributed storage is an issue as yet to be resolved.

### **Report Indexing Method**

A distinction is made between the archival format of the abstracts and the presentation format. Abstracts are accepted in refer format (ref. 6), and a script is used to translate the refer format into hypertext markup language (HTML). (See figs. 9 and 10.) Although refer is a popular bibliographic format, it is generally not preferred by users. HTML (ref. 7) is currently the obvious choice for presentation of the abstracts with pointers to reports. (See sample abstracts in figs. 10 to 12.)

The resulting HTML files are then indexed with WAIS. The WAIS index program was originally unable to index HTML documents. The LTRS developers modified the index program so that it handled HTML documents appropriately. The resulting changes to the WAIS index program have been submitted to the Clearinghouse for Networked Information Discovery and Retrieval (CNIDR), the organization that maintains the free version of WAIS.

#### **Report Collection**

Central to wide use of any document delivery system is the quality and extent of the collection. LTRS currently provides access to over 300 unique reports, including NASA reports, journal articles, conference papers, and NASA-sponsored theses. During the first 18 months of operation, LTRS has delivered over 11,000 copies of reports from this database. (See appendix B.)

The initial report set was comprised of unrestricted NASA formal technical reports that the Research Publishing and Printing Branch (RPPB), STID, had archived in native electronic format, that is, in the format of the software used to produce the reports ( $T_EX$ ). These files were converted to PostScript format, a de facto standard used for output to printers. Supplying reports in the PostScript format provides most users with the ability to download and print.

The RPPB continues to submit new NASA Langley formal reports to the LTRS system. After the manuscripts are approved for printing and hardcopy distribution, the same electronic files are processed into PostScript files for electronic delivery and submitted to LTRS. Because these reports are all produced with the same publishing software and conventions, the abstract and citation in refer format can automatically be extracted from the electronic file. These formal reports continue to be a large subset of the total number of reports available from the system.

Authors may submit their reports directly to LTRS by preparing a citation in refer format and submitting it along with a PostScript file for the report. If the report is already available on-line, the author may simply include the universal resource locator (URL) so that LTRS can point to the report on the author's server. Documents formated with HTML are also accepted.

The most limiting factor to the quality of the LTRS report collection is that not all reports are complete. Often manual processes are still used to produce the report manuscripts; for example, photographs and illustrations may be pasted up instead of electronically inserted. Then, the reports on LTRS do not include the manually inserted material.

## **Evaluation of LTRS by Langley Users**

LTRS was evaluated on three platforms: Macintosh, UNIX, and PC. Instructions illustrating the searching, browsing, viewing, and printing capabilities of the system were written for each platform. (See appendix C.) Thirty-three Langley volunteers from technical and nontechnical fields were asked to follow these instructions and then fill out a two-part evaluation form of Likert scale and free responses.

The volunteers were divided into four sessions so that they could evaluate LTRS on their platform of choice: Macintosh (16), UNIX (11), and PC (7). At each session four Macintosh, three UNIX, and two PC platforms were available. Each platform had the same version of NCSA Mosaic and the appropriate viewing and printing software. The Macintosh and UNIX platforms were connected to a printer. No formal training was given during the scheduled 2-hour sessions; however, EDTR group members were available to answer questions. Most volunteers finished in 1 to 1.5 hours.

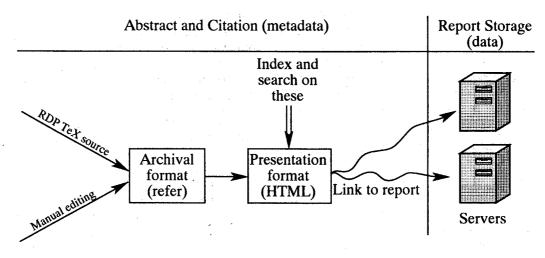
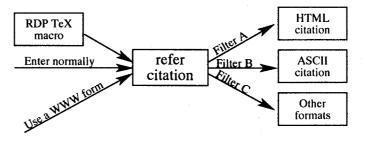
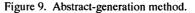


Figure 8. LTRS data model.





%A Robert A. Mitcheltree
%A Peter A. Gnoffo
%T Stagnation Point Nonequilibrium Radiative Heating and the Influence of Energy Exchange Models
%J Journal of Thermophysics and Heat Transfer
%V 6
%N 3
%D July-September, 1992
%P 412-418
%O Prior version appeared as AIAA Paper 91-0571
%U ftp://techreports.larc.nasa.gov/pub/techreports/larc/92/jtht-6-3-92.ps.Z
%X A nonequilibrium radiative heating prediction method has been used to evaluate several energy exchange models used in nonequilibrium computational fluid dynamics methods. The radiative heating measurements from the FIRE~II flight experiment supply an experimental benchmark against which different formulations for these exchange models can be judged. The models which predict the lowest radiative heating are found to give the best agreement with the flight data. Examination of the spectral distribution of radiation indicates that despite

Figure 10. Sample abstract in refer format.

close agreement of the of the total rediation, many of the models examined predict excessive molecular radiation. It is suggested that a study of the nonequilibrium chemical kinetics may lead to a correction for this problem.

%A Lin C. Hartung

<TITLE>Stagnation Point Nonequilibrium Radiative Heating and the Influence of Energy Exchange Models</TITLE>

<i><A HREF="http://www.larc.nasa.gov/ltrs/ltrs.html">Langley Technical Report Server</A></i><hr>

<OL>

<LI><A NAME="">Lin C. Hartung, Robert A. Mitcheltree and Peter A. Gnoffo, <B> ' ' <A HREF="ftp://techreports.larc.nasa.gov/pub/techreports/larc/92/jtht-6-3-92.ps.Z">Stagnation Point Nonequilibrium Radiative Heating and the Influence of Energy Exchange Models,</A> ' ' </B> <I>Journal of Thermophysics and Heat Transfer</I>, vol. 6, no. 3, July–September, 1992, pp. 412–418, Prior version appeared as AIAA Paper 91–0571. </A> <P> <B>Abstract: </B> A nonequilibrium radiative heating prediction method has been used to evaluate several energy exchange models used in nonequilibrium computational fluid dynamics methods. The radiative heating measurements from the EIDE. I Give the first of the

from the FIRE~II flight experiment supply an experimental benchmark against which different formulations for these exchange models can be judged. The models which predict the lowest radiative heating are found to give the best agreement with the flight data. Examination of the spectral distribution of radiation indicates that despite close agreement of the of the total rediation, many of the models examined predict excessive molecular radiation. It is suggested that a study of the nonequilibrium chemical kinetics may lead to a correction for this problem.<P>

Figure 11. Sample abstract in HTML format.

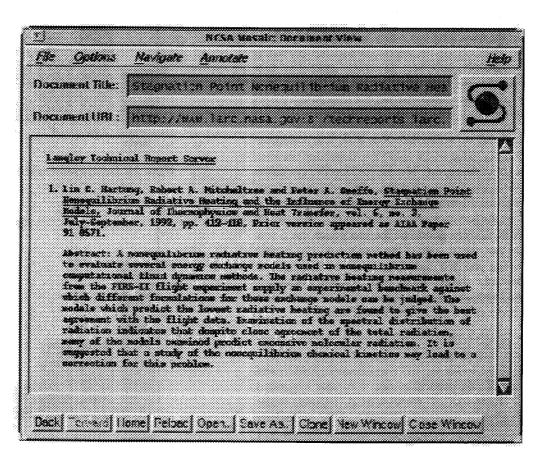


Figure 12. Sample abstract displayed in NCSA Mosaic.

The results of this evaluation are summarized in this section.

#### **Evaluation Results: Likert Responses**

In section I of the evaluation, the volunteers were asked for their level of experience with their chosen platform, the Internet, and NCSA Mosaic. Most considered themselves very experienced on the platform tested (fig. 13), not as experienced with the Internet (fig. 14), and even less familiar with NCSA Mosaic (fig. 15).

Section I of the evaluation form also contained 25 statements about LTRS. The volunteers were asked to what extent they agreed with the statement on a Likert scale of 1 (do not agree) to 5 (strongly agree). These statements can be grouped into the following five categories: instructions (statements 1,14,15), searching (statements 3 to 7, and 21), report viewing (statements 8 to 12), printing (statements 13 and 22), and report types (statements 16 to 20, 24, and 25). Each statement as it appeared on the evaluation form is presented along with the response in table 5.

Most volunteers thought that the instructions and the LTRS home page were clear and easy to understand. However, one commented that the LTRS instructions needed to be taken "slowly." Most volunteers were satisfied with the searching capability, wanted to be able to search the full text of the report, found the browsing capability valuable, and were in strong agreement that they wanted to view the abstract before the full text. For the most part, they liked having the capability to go directly to the full text of the report.

In response to statements 8 and 9, one volunteer commented that what one would view depended on what one knew about the report. Most would use the system to preview the paper before printing. One volunteer commented that, for the most part, the procedure for viewing the paper on the screen was straightforward. Another felt the instructions were good but the procedure itself was not easy to use. Most wanted the document to be legible on the screen and felt the procedure for printing was straightforward. Either training or written instruction was deemed necessary for the experienced computer user and even more so for the inexperienced user.

Even though LTRS currently provides access to over 300 reports, they judged LTRS to be a valuable system. They would like to see the full text of classic NACA and NASA reports. In particular, one volunteer suggested immediate inclusion of some NACA reports, while another suggested expanding LTRS slowly to include past reports. Even though they thought figures and photos currently unavailable electronically should be added to the reports, they indicated that LTRS was still a

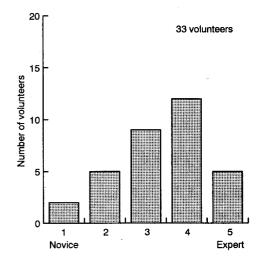


Figure 13. Level of experience on platform.

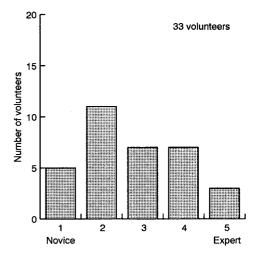


Figure 14. Level of experience with Internet.

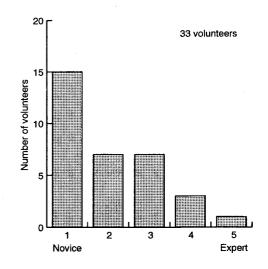


Figure 15. Level of experience with NCSA Mosaic.

# Table 5. Responses to LTRS Survey Questions

# [Response of 1 or 2 on Likert scale = Do not agree; response of 4 or 5 on Likert scale = Agree]

	Survey	Mean	Do not agree, percent	Agree, percent
1.	The written instructions explaining how to use the LTRS system are clear and easy to understand	3.91	3	76
2.	The LTRS home page is clear and easy to understand.	4.18	0	85
3.	Searching LTRS for a specific author or word is intuitive and user friendly.	4.09	3	76
4.	The search results screen is clear and easy to understand.	3.76	6	61
5.	I am satisfied with the current search capability provided by LTRS which allows for retrieval from the bibliographic description (author, title, report number, date, etc.) and abstract.	3.80	6	73
6.	I want the capability to search the full text of the report or paper.	3.82	6	61
7.	The LTRS system provides browsing capability for bibliographic descriptions (title, author, report number, date, etc.) and abstracts which is both easy to use and valuable to me as a researcher.	4.00	3	76
8.	I want to view the bibliographic description and abstract of the paper before deciding to view the full text of the report.	4.55	0	94
9.	I want the capability to navigate directly to the full text of the report or paper without having to first view the bibliographic description and abstract.	3.30	27	42
10.	I would use the system to preview the text before printing the complete report or paper.	4.42	3	91
11.	The procedure for viewing and reading the full text of the report or paper on the screen is easy, simple, and straightforward.	3.55	15	45
12.	I require the full text of the report or paper to be fully legible on the screen.	3.79	9	61
13.	The procedure for printing the full text of the report is easy, simple, and straightforward.	3.48	12	48
14.	Written instructions and/or training on how to use LTRS is not necessary for the experienced computer user since the system is very intuitive and easy to use.	2.61	52	24
15.	Written instructions or training on how to use LTRS is not necessary for even the inexperienced computer user since the system is very intuitive and easy to use.	1.67	85	3
16.	With only selected reports and papers from 1989 to the present, LTRS's material content is still valuable.	4.03	9	73
17.	LTRS should include the electronic full-text version of classic NACA and NASA reports issued prior to 1989.	4.30	3	82
18.	For LTRS to be a valuable research tool, the missing figures and photographs must be added to the system.	3.55	18	55
19.	In spite of the missing figures and photographs, LTRS is still a valuable research tool.	3.88	3	73
20.	The LTRS reports which are available in hypertext format are easier to work with and provide greater research value than those which are in PostScript format.	3.45	12	45
21.	Response time for searching and browsing is acceptable.	3.56	15	67
22.	The response time for printing is acceptable.	3.58	9	55
23.	Overall, the LTRS system is an easy to use, effective, and valuable research tool.	4.12	3	85
24.	In the future, the electronic full text of Langley reports and papers should be stored in a permanent and routinely accessible distribution system available on the Internet.	4.58	0	88
25.	I would be willing to contribute my own reports and papers for electronic distribution via LTRS.	4.64	0	94

valuable research tool. In addition, most liked to view hypertext format reports better than PostScript reports.

Most agreed that the response time for searching and browsing was acceptable; however, one commented that the PC response time was slow. (Exact times were not measured; thus, reaction to response time is extremely subjective.) The 25 who tried printing found the response to be acceptable. Most believed that Langley reports should be available on the Internet, and one wanted Langley researchers to also have access to foreign reports. Most were strongly agreeable to adding their reports to LTRS.

#### **Evaluation Results: Free Responses**

In section II of the evaluation, the volunteers were asked to list (1) what they felt were the strengths of the LTRS system, (2) what features needed to be added or enhanced in the system, (3) what specific problems they encountered during the evaluation session, and (4) any thoughts they had about the collection of reports and papers available on LTRS. This section summarizes those comments, which were consistent with those indicated numerically in section I of the evaluation.

In response to question 1 concerning the strengths of the LTRS system, the comments ranged from "the basic idea is there but it needs work" to "the system has great potential." Overall, the volunteers believed that the major strength of LTRS is that it allows researchers to access and search Langley publications from their desktop. They thought that having access to Langley reports would make literature searches easier and would reduce the turnaround time for needed information. This theme of on-line access to reports (instant availability of reports) occurred repeatedly in the volunteers' comments. They liked having the full text available so that they could preview the report or abstract before printing. They also liked the quick searching techniques and the ease of use.

In response to question 2 concerning what features needed to be added or enhanced, two comments were prevalent: The volunteers wanted to have more reports available in the collection, and they wanted missing figures and photographs included to complete the reports. One volunteer wanted to see NACA as well as NASA reports prior to 1989 added to the collection. In addition, the volunteer wanted the collection to include reports currently processed through STID.

One volunteer suggested that the system include an abbreviated browsing capability of abstracts by year and the ability to browse abstracts by subject. The capability to view the documents was not consistent; that is, some reports were encountered that could not be viewed past the first page. The volunteers would like the viewing capability to be consistent and enhanced so that the reports are clearer on the screen. Another suggested that the abstracts include the total size of the compressed file so that users could determine whether their local machine has sufficient disk space to download and decompress the file.

In response to question 3 concerning problems encountered using LTRS, the comments seemed to deal primarily with the limitations of the platform rather than LTRS (i.e., speed, memory, and disk space) or viewing software (i.e., MacGS or Ghostview). One problem seemed to be not knowing when the file was compressed PostScript and when it was uncompressed and not knowing what software was needed with which version.

In response to question 4 concerning the collection of reports and papers available on LTRS, almost every respondant thought that the LTRS database should be expanded to include University grantees' reports; all NASA TM, TP, and journal articles; and JIAFS articles. One volunteer suggested that the report date be added to alphabetic and subject lists. One volunteer wanted to know how to contribute reports. Another hoped more people would take advantage of the system and increase the collection of reports.

The volunteers also offered some suggestions concerning the LTRS instructions used for the evaluation. As a result, the instructions in appendix C will be modified to incorporate their suggestions.

## Use of LTRS by U.S. Industry

As previously discussed, aerospace companies are wary of Internet access and generally provide restricted access or none at all. In contrast, such disciplines as astronomy, physics, and computer science seem to have enthusiastically embraced publication over the Internet.

Appendix B lists organizations that have accessed LTRS. From the list of 173 companies, 16 aerospace companies can be identified, including Gulfstream, Lockheed, Loral, Martin Marietta, McDonnell Douglas, Pratt & Whitney, Rockwell, TRW, Boeing, and United Technologies. In addition to numerous computer and software companies, many nonaerospace companies who would be candidates for dual use of NASA's aerospace technology are listed. For example, ARCO Oil and Gas, Allied-Signal, Dupont, Eastman Kodak, Exxon, Ford, General Motors, Monsanto, and Pacific Gas and Electric have used the LTRS system. Also over 200 universities and government agencies have accessed LTRS.

Although LTRS has not made great penetration into the aerospace community, it has demonstrated the

capability of disseminating Langley technical reports to the aerospace industry.

## **Implementation of EDTR System**

Management support and guidance are essential to the success of any electronic distribution system. Thus, the EDTR working group devised a policy statement that provides guidelines for distribution and storage as well as a framework for managing the electronic distribution system. The policy statement proposed by this group is given in appendix A. Note that Langley management has not adopted this policy. However, it has been reviewed for adherence to copyright law and generally conforms to NASA STI publication policy.

The proposed policy statement has two major impacts on the publishing strategy of NASA Langley. First, approval of the policy statement amounts to a mandate to all Langley authors to provide technical documents for electronic dissemination: "Therefore, in any instance where NASA has the legal right to do so, publications shall be made available electronically via Internet to NASA customers." (See appendix A.) Such a mandate leads to the second impact: an electronic server for Langley technical documents must be supported as part of the Langley publication infrastructure. Such support includes technical support for the server system, support for producing the on-line information, managing the information to ensure responsible and reliable dissemination, strategic planning, and promoting use of the system among aerospace and nonaerospace customers.

To ensure the success of the electronic distribution system, the EDTR working group outlined a framework for managing the system. This framework is based upon the establishment of a committee responsible for establishing publication standards for electronic documents, monitoring adherence to the EDTR policy, and maintaining the structure of the electronic distribution system. The goals of the committee are as follows:

1. Establishing electronic publication standards: The possibility of electronic dissemination immediately raises policy and quality issues. Should restricted documents be available on Internet? Should electronic versions with illustrative material missing be on-line? Should documents submitted to external publishers (e.g., journals) be on-line? The future will hold a new set of issues. On-line dynamic documents (bibliographies, computer documentation, data sets) will be up-to-date, while their hard copy counterparts become obsolete. Multimedia or hypermedia documents will exist on-line, while no hard copy counterpart will be possible. The committee will provide a forum for resolving these issues with STI Program management.

- 2. Monitoring adherence to policies: The disadvantage of a distributed LTRS system is the difficulty of coordinating and communicating policy. Communication of policy is the primary goal of the committee. In general, the Langley community is very responsible when STI policy (e.g., copyright and management approval) is clearly communicated.
- 3. Maintaining structure of LTRS system: A technical interface among server administrators, publication policy makers, and information professionals will ensure that a well-designed state-of-the-art system is maintained that adheres to NASA management requirements and meets NASA information customer needs.
- 4. Ensuring reliability of the system: Any quality information system must display dependability and integrity. Information including bibliographic information, should be reliable in content and availability.
- 5. Strategic planning: Electronic publishing technology is in its infancy. As this technology matures, we must bring new developments to bear on deficiencies in the current LTRS system.
- 6. Promoting use of LTRS system: While some technical disciplines such as astronomy, physics, and computer science are well-connected and proficient in use of Internet for EDTR, the aerospace community is not. To capitalize on the cost benefits and efficiency of electronic information transfer, we must market EDTR.

Reference 8 suggests that management of electronic delivery requires a balance of "the reality of decentralized, dispersed, user-oriented agency automation with the need for some measure of centralized, yet flexible, policy direction and oversight." The concept of an LTRS Committee proposes to do just that, to capitalize on the decentralized, dispersed, user-oriented WWW servers coming on-line under auspices of branches and divisions, while providing central, flexible policy direction and information management services (e.g., indexing and browsing capabilities).

## **Concluding Remarks**

# Approval and Implementation of Policy Statement

Because of the wide impact of EDTR on Langley and its significance in support of technology transfer, the working group recommends that the Langley Senior Staff endorse the policy statement for implementation by the Langley STI Program through the Langley Technical Report Server (LTRS) Committee described in the policy statement.

The use of electronic on-line publishing is an important strategic direction with impacts not only on the publishing research community but also on the Langley institution, in particular, the Langley STI Program. Langley and NASA are embracing the World Wide Web (WWW) technology at the "grass roots" level, as are many of our customers. WWW is rapidly becoming a de facto standard technology for electronic dissemination not only within NASA but also within the electronic publishing community in general. Any EDTR effort should conform to WWW standards; however, several electronic document delivery projects not based on WWW are in various stages within NASA. With endorsement by Langley management of the policy statement, EDTR will no longer be a grass roots experiment at Langley; it will become a strategic direction for the STI Program management.

## **Enhancements to LTRS**

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The open, unrestricted LTRS system must be extended to restricted information to provide a secure way of quickly disseminating our commercially valuable information to NASA's domestic customers. The current unrestricted system will provide a catalyst for the restricted system. Users who like LTRS will be willing to accept inconveniences of accessing a separate, similar restricted system. However, a restricted system will entail investment in labor to qualify users and in systems to manage the risk of restricted information on-line.

The evaluation of LTRS by Langley users clearly indicated areas for improving functionality: for example, providing full-text searching, producing hypertext documents, and adding missing illustrations and photographs. A high priority should be enlarging the collection of documents to include current informal reports, meeting papers, and articles as well as NACA and pre-1989 NASA reports. In addition to the functionality and content of the server, client configuration presents issues such as auxiliary software for viewing and printing, available disk space, training, and instructions. Although many of these problems represent technological challenges, some can be solved or minimized by system design and process improvements. For example, the LTRS collection can certainly be rapidly enlarged by instituting a process making electronic dissemination routine.

The Langley technical publications program is at a critical juncture. EDTR has been demonstrated to be feasible with no direct cost for software imposed on NASA or its customers. Should Center management endorse EDTR as the strategic direction for disseminating Langley STI, Langley is ready to face the challenges of developing, designing, and managing an electronic dissemination system.

NASA Langley Research Center Hampton, VA 23681-0001 December 15, 1994

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# Appendix A

## **Proposed Policy**

## **Policy Statement Introduction**

For the United States to remain an international leader in aerospace research and development, NASA must not only perform state-of-the-art research relevant to U.S. industry but must also make the results of that research available in the fastest, most cost-effective manner. Technology currently exists to make NASA's products (formal and informal publications, data sets, etc.) available electronically.

Responsibility for maintenance and technical support of an electronic document dissemination system shall lie with the LTRS committee, under the direct supervision of the head of the Research Publishing and Printing Branch (RPPB). This committee, comprised of representatives from each division at Langley, shall have responsibility for establishing publication standards for electronic documents (including proper copyright notations), monitoring adherence to this policy statement, updating this policy statement, and maintaining the structure of the electronic distribution system. The committee shall further be responsible for promotion of the use of the electronic distribution system as a means of technology transfer to aerospace and nonaerospace customers.

This policy statement covers the following aspects of the electronic dissemination of unclassified, unlimited technical reports: (1) copyright, (2) distribution, (3) electronic document storage, (4) preliminary release of formal reports, (5) approval for posting informal reports to distributed servers, and (6) publication standards for electronic documents.

### Copyright

All NASA publications that are cleared for public release (unclassified, unlimited TP's, low-numbered TM's, high-numbered TM's, conference papers, journal articles, etc.) should be posted to an electronic server accessible worldwide via the Internet to assist the customer in rapidly obtaining NASA research. If NASA produced the research, then it is by definition a work of and property of the United States government. Even in cases of journal publications, NASA retains a license to use the work in any manner deemed in the interest of the U.S. government. Therefore, in any instance where NASA has the legal right to do so, publications shall be made available electronically via Internet to NASA customers. In instances where copyright agreements exist with external publishers, the copyright statement must be included in the electronic version of the document.

#### Distribution

Proper handling of restricted information necessarily requires that some level of difficulty be imposed (for proper user validation) in obtaining the data. The unfortunate effect is a delay to eligible users. The electronic distribution system is patterned after the current paper system to preclude foreign access to restricted information. Currently, within the open Internet environment, this means that restricted (classified, limited, ITAR, FEDD, etc.) information is *not* included for electronic dissemination.

## **Electronic Document Storage**

Because of the large volume of documents published within NASA annually, a distributed document storage environment is necessary. (Additionally, the disk space required to store a compressed PostScript document that includes figures is approximately 1 MB.) As previously noted, the LTRS committee shall have responsibility for maintenance and technical support of this distributedstorage electronic dissemination system, as well as responsibility for promotion of the use of the electronic distribution system within the aerospace community.

All formal NASA publications shall be maintained centrally, under the control of the chair of this committee, and representatives from each Langley division to this committee will have responsibility for maintaining their own division repository of informal documents (conference papers, journal publications, etc.). The electronic dissemination system (known as LTRS) will index and point to these informal report servers via NCSA Mosaic. (NCSA Mosaic is a well-documented public-domain software for browsing and searching the world-wide web, available for PC, Macintosh, and most UNIX platforms via anonymous FTP. Thus, the burden of obtaining and integrating NCSA Mosaic and associated tools shall lie with the end user.) To insure continuity and availability of papers within the system, division representatives shall offer the committee electronic versions of any documents prior to removal of such documents from the distributed servers.

#### **Preliminary Release of Formal Reports**

Upon completion of the technical changes required by the editorial committee for NASA formal publications, the author shall have the option of seeking division approval for electronic release of the preliminary document. If approval is granted, the document shall be clearly marked that it is a preliminary draft, cleared for release with respect to its technical content, but not yet meeting NASA's editorial requirements. The document shall also bear the date of that release with an estimate of when the final draft will be available. Once prepared and cleared for release, the final draft will replace the preliminary draft on the file server. It shall be the responsibility of the customer to retrieve the updated copy of the report.

## Approval for Posting Informal Reports to Distributed Servers

Approval for posting new informal reports to distributed servers shall be obtained from the author's division office. Determination of document restrictions shall continue to be made at the division level. Once the document has been approved, responsibility for updating and maintaining the division's report server and for providing LTRS with the appropriate indexing information shall lie with the division's representative to the LTRS committee.

#### **Publication Standards for Electronic Documents**

The LTRS committee shall define standards for electronic versions of NASA documents. In the interest of making NASA publications rapidly available, electronic documents generated prior to the definition of such standards will be accepted for posting to the report server provided that they are significantly complete, that is, full text with sufficient figures and tables to be useful. The documents must be marked such that the absence of any data, photographs, figures, or tables is obvious. Responsibility for assessing the desirability and cost effectiveness of completing electronic versions of existing documents (e.g., via scanning photographs, figures, etc.) shall lie jointly with the author and the head of RPPB.

# **Appendix B**

# **LTRS Usage Statistics**

Domain	No.
.com	1282
.edu	3120
foriegn	3781
.gov	207
.larc.nasa.gov	1358
.mil	287
.nasa.gov	750
.net	19
unknown	213
.org	51

#### Reports Accessed by Foreigners

Country	No.
Austria	219
Australia	208
Canada	451
Switzerland	105
Germany	423
Finland	69
France	466
Italy	58
Japan	383
The Netherlands	185
Norway	99
Sweden	70
Singapore	60
Taiwan	392
United Kindgom	335
Others	258

## **Organizations That Have Accessed LTRS**

## Companies

3Com Corporation ARCO Oil and Gas ASK/Ingres Products Division AT&T Bell Laboratories AT&T Global Information Solutions Adobe Systems Inc. Adroit Systems, Inc. Advance Geophysical Corp. Advanced Decision Systems Advantis Alcatel Network Systems Allied-Signal, Inc. Anasazi, Inc. Apple Computer Corporation Asea Brown Boveri Aware, Inc. BP **Bailey Controls Company** Ball Aerospace, Inc. Beckman Instruments, Inc. Bob Gustwick & Associates, Inc. Bolt Beranek and Newman Inc. Box Hill Systems Corporation Bull HN Information Systems Inc. Byte Information Exchange **CAE-Link** Corporation CFD Research Corporation **CLAM Associates** Calspan Advanced Technology Center Centerline Software **Centric Engineering Systems** Charles Stark Draper Laboratories Chevron Information Technology Co. Chicago Title & Trust Cisco Systems, Incorporated **Compaq Computer Corporation** 

**Computervision Corp Concurrent Computer Corporation Concurrent Technologies Corporation** Connected, Inc. Convergent Technologies, Inc. **Convex Computer Corporation** Cray Research, Inc. DHL Systems, Inc. **Data General Corporation Dell Computer Corporation** Delmarva Power and Light Company **Delphi Internet Service Corporation Digital Equipment Corporation Dupont Experimental Station** EUTeC Eastman Kodak **Electric Power Research Institute Electronic Data Systems Electronic Data Systems** Enterprise Integration Technologies Corp. Epoch Systems Inc. Exa Corporation Exxon Research and Engineering Fluent, Inc. Ford Motor Company **GTE Government Systems Corporation** General Dynamics / Computer Sciences Corp. General Motors Research Laboratory General Research Corp. Gulfstream Aerospace Corporation Hal Computer Systems, Inc. Harris Corporation Hewlett-Packard Hibbett, Karlson, and Sorensen Inc. Honeywell, Inc. Horizon Research Inc. Hughes Aircraft Company Hughes Information Technology Company IDT/CCTT Informix Software, Inc. **Insignia Solutions Inc** Intel Corporation

Intergraph Corporation Intermetrics, Inc. **International Business Machines** Internet Direct, Inc. JP Morgan James Spottiswoode & Assoc. Kendall Square Research Corporation Kofax Image Products LSI Logic Corporation Landmark Graphics Corporation Lockheed Information Technology Company Locus Computer Corporation Loral Corporation MRJ Inc. Malin Space Science Systems Martin Marietta Astronautics Group McDonnell Douglas Corporation Mead Data Central Merck and Co., Inc. Micrognosis Microsoft Corporation Mirador Computing Systems Monsanto Company Motorola Inc. NETCOM NYNEX Science and Technology Ncube Network Equipment Technologies, Inc. Networx, Inc Niagara Mohawk Power Corp. North American Philips Corporation Northern Telecom Ltd. **Oracle Corporation** PARAMAX SYSTEMS CORPORATION PIXAR Pacer Software, Inc. Pacific Bell Pacific Gas and Electric Company Panasonic Technologies, Inc. Panix Public Access Unix of New York Performance Systems International Inc. PictureTel Corporation

Portal Communications Company Pratt & Whitney Process Software Corporation Pyramid Technology Corporation **Oualcomm Inc.** Radius Inc. Rational Systems, Inc. **Real/Time Communications Rocket Research Company Rockwell International** SAIC SAS Institute, Inc. SCUBED Corporation SPARTA, Inc. SRI International SSDS, Inc. Schlumberger Limited Sequent Computer Systems, Inc. Silicon Graphics, Inc. Software Tool & Die Solbourne Computer Inc. Southwestern Bell Corporation Sterling Software Stratus Computer, Inc. Structural Dynamics Research Corporation Sun Microsystems Inc. Sun Tech Journal TRW Inc. Tandem Computers, Inc. Tekelec, Inc. Teknekron Communications Systems, Inc. **Telebit Corporation Texas Instruments** The Analytic Sciences Corporation The Boeing Company The MathWorks, Inc. The Wollongong Group Thinking Machines Corporation Titan, Inc. **Transarc Corporation** Unison Software, Inc. **Unisys** Corporation

United Technologies Corporation Varian Associates, Inc. Visidyne Inc. Warner Lambert / Parke-Davis Western Digital Corporation Westinghouse Electric Corporation Wyvern Technologies, Inc. **XMission** Xerox Palo Alto Research Center **Zycad Corporation** Universities **Appalachian State University** Arizona State University Auburn University **Baylor College of Medicine Baylor University Boston University Bowling Green State University Brandeis University** Brown University **Bucknell University** Cal Poly State University California Institute of Technology California State University, Chico Carnegie-Mellon University Case Western Reserve University City University of New York **Clarkson University Clemson University** College of William and Mary Colorado State University **Columbia University Cornell University** Drake University Drexel University **Duke University** Embry-Riddle Aeronautical University **Emory University** Florida Institute of Technology Florida State University ACNS George Mason University

George Washington University Georgia Institute of Technology Hampton University Hartford Graduate Center Harvard University Indiana University Institute for Computer Applications in Science and Engineering Iowa State University Johns Hopkins Applied Physics Laboratory Johns Hopkins University Kent State University Lehigh University Louisiana State University Louisiana Tech University Loyola College Marquette University Massachusetts Institute of Technology Mayo Foundation McGill University Internet Merit Computer Network Miami University Michigan State University Michigan Technological University Minnesota State University System Minnesota Supercomputer Center Mississippi State University Monmouth College Montana State University Muskingum College National Center for Atmospheric Research National Technology Transfer Center New Jersey Institute of Technology New Mexico State University New York University North Carolina Agricultural and Technical State University North Carolina State University Northeast Missouri State University Northeastern University Northwestern State University Northwestern University

Nova University **Ohio Northern University Ohio State University Ohio University Oklahoma State University Old Dominion University Oregon Graduate Institute Oregon State University** Pennsylvania State University Pittsburgh Supercomputer Center Polytechnic University Prairie View A&M University **Princeton University Purdue University** Rensselaer Polytechnic Institute **Rice University** Rochester Institute of Technology **Rockefeller University Rutgers University** SUNY College of Technology SUNY at Buffalo San Diego State University San Diego Supercomputer Center Santa Clara University Seattle University Southern College of Technology Southern Illinois University Southern Illinois University at Edwardsville St. Louis University St. Mary's College of Maryland Stanford University State University of New York at Stony Brook Syracuse University Temple University Texas A&M University Texas A&M University - Corpus Christi **Texas Education Agency** The Institute for Advanced Study The Wichita State University University of Akron University of Alabama University of Alabama in Huntsville

University of Arizona University of Arkansas Little Rock University of California University of California at Berkeley University of California at Irvine University of California at Los Angeles University of California at Riverside University of California at San Diego University of California at San Francisco University of California at Santa Barbara University of Central Oklahoma University of Chicago University of Cincinnati University of Colorado University of Connecticut University of Dayton University of Delaware University of Denver University of Florida University of Houston University of Illinois at Chicago University of Illinois at Urbana-Champaign University of Iowa University of Kansas University of Kentucky University of Maine University of Maryland University of Maryland Baltimore County University of Massachusetts University of Michigan -- Computing Center University of Minnesota University of Missouri-Rolla University of Nebraska at Lincoln University of Nevada at Las Vegas University of New Hampshire University of New Mexico University of North Carolina at Chapel Hill University of North Carolina at Charlotte University of North Florida University of Oklahoma University of Oregon University of Pennsylvania

University of Pittsburgh University of Pittsburgh Medical Center University of Rochester University of Southern California University of Southern California University of Tennessee University of Tennessee at Chattanooga University of Texas at Arlington University of Texas at Austin University of Texas at Dallas University of Texas at San Antonio University of Toledo University of Toronto University of Tulsa University of Utah University of Virginia University of Washington University of Wisconsin University of Wisconsin, Milwaukee Vanderbilt University Villanova University Vincennes University Virginia Commonwealth University Virginia Institute of Marine Science Virginia Tech Wake Forest University Walla Walla College Washington University Wayne State University West Virginia Network for Educational Telecomputing West Virginia University Western Washington University Worcester Polytechnic Institute Yale University

## **Government Agencies**

Ames Laboratory Argonne National Laboratory Battelle Pacific Northwest Laboratory Continuous Electronic Beam Acceleator Facility Department of Energy Richland Fermi National Accelerator Laboratory Idaho National Engineering Laboratory Lawrence Berkeley Laboratory Lawrence Livermore National Laboratory Los Alamos National Laboratory National Energy Research Supercomputer Center National Institute of Standards and Technology National Institute of Standards and Technology National Institutes of Health National Oceanic and Atmospheric Administration Oak Ridge National Laboratory Sandia National Laboratories Super Conducting Super Collider Laboratory U.S. Department of Energy U.S. Department of the Interior USDA Forest Service- Pacific Southwest Research Station USDA National Agricultural Library United States Geological Survey Westinghouse Savannah River Company **Military Institutions** Air Force Institute of Technology Army Armament Research Development and **Engineering** Center David Taylor Research Center Defense Information Systems Agency Defense Logistics Agency **Defense Technical Information Center** Eglin Air Force Base Human Systems Division National Computer Security Center Naval Air Test Center Naval Air Test Center Naval Air Weapons Station Naval Civil Engineering Laboratory Naval Ocean Systems Center Naval Postgraduate School Naval Research Laboratory Naval Ship Systems Engineering Station Naval Surface Warfare Center Naval Undersea Warfare Center Naval Weapons Center Naval Weapons Center

Rome Laboratory **U.S Army Corps of Engineers** U.S. Army Research Laboratory United States Air Force Academy Wright Patterson Air Force Base **Network Organizations** Communications for North Carolina Education, Research, and Technology Digital Express Group, Inc. EUnet Ltd Geschaeftsbereich XLINK Hong Kong Supernet Information Access Technologies, Inc. InteleCom Data Systems MountainNet, Inc. NirvCentre Shadow Information Services Stichting NLnet The Internet Access Company Other Organizations American Mathematical Society Capital Area Central Texas Unix Society **Chemical Abstracts Services** Commission of the European Communities Cooperative Library Agency For Systems and Services **European Southern Observatory IDA/Supercomputing Research Center** Industrial Technology Institute Institute for Defense Analyses International Internet Association Logistics Management Institute **MITRE** Corporation Microelectronics Center of North Carolina North Carolina Supercomputing Center Online Computer Library Center, Inc. **Open Software Foundation Research Triangle Institute** Software Productivity Consortium The Information Network of Kansas The Rand Corporation

# Appendix C

# **LTRS Instructions**

## Instructions for Using LTRS on the Mac

STEP 1. Open Mosaic folder. Double click on NCSA Mosaic 1.0.3. If you have the NASA Langley Home Page as your default the following appears on your screen

NASA Langley Research Center Home Page	
🗘 🛱 🔯 NASA Langley 🐨 🖉 Search keyword	
URL: [http://www.tarc.nasa.gov/larc.btm]	
	12
Welcome <u>New Users</u> !	
NASA Langley Research Center	
MADA Dangiey Research Center	
Hamatan Vissinia	
Hampton, Virginia	
The Langley Vision, Mission and Values     About Langley Research Center	
<ul> <li>Taking a look at Langley Research Center</li> </ul>	
. What's New at the Langley Research Center Web	
<u>Colloquium and Sigma Series Lecture Information</u>	
<ul> <li>LaRC sponsored Conferences, Workshops, and Symposiums</li> <li>Langley is reorganizing !</li> </ul>	
Find LaRC Personnel (or non-LaRC Personnel)	
• Total Quality Management (TOM) @ LeRC	
<ul> <li>LaRC newsgroups: <u>here general</u> and <u>here announce</u> (LaRC access only)</li> </ul>	
Langley Technology Access Services	
Technology Experts Locator Service (TELS)	
<u>Technology Opportunities Showcese (TOPS)</u> Lengley Technical Report Server (LTRS)	
and and an All California and Frankreiten and Allen and All	
Other NASA Information	
• The NASA Vision	
NASA News and Hot Topics	
NASA Press Releases	
<ul> <li>NASA Online Information</li> <li>NASA Technical Report Server (NTRS)</li> </ul>	
Government Laboratories	

Items are either in black, blue, or symbols. Move the cursor to an item in black - cursor remains the same. Move cursor to item in blue or symbol - cursor becomes a pointing hand. When this occurs you can activiate the item by clicking on the item. Once you look at an item the blue will become red indicating you have already looked at that item. You can still look at it again even though it is red. **NOTE: For B&W monitor, items are underlined for links** 

STEP 2. Click on LTRS. The following will appear on your screen.

Langley Technical Report Server (LTRS)	
Search keyword	
URL: http://techreports.larc.nasa.gov/ltrs/ltrs.html	
	₽ P
NASA Langley Research Center Technical Reports	
Please fill out the LTRS feedback form.	
Mac and PC users: Most reports are compressed PostScript. See FAQ for more details.	
<ul> <li>NASA Technical Report Server: Search and Retrieve DFRC, LaRC, ICASE, and NAS</li> </ul>	
Technical Reports	
- Search and Retrieve LaRC Technical Reports	
<ul> <li>Abstract Lists for LaRC Technical Reports</li> </ul>	
- <u>1989</u>	
• <u>1990</u>	
* <u>1991</u>	
• 1992	
• <u>1993</u> • 1994	
• <u>1224</u> • <u>All years (1989-1994)</u>	
• Find LaRC Authors	
LTRS Frequently Asked Questions (FAQ)	
LaRC Home Page NASA Home Page	
Last Updated Mon Jun 6 18:26:52 EDT 1994	11
<u>Michael Nelson (m.l.nelson@larc.nasa.gov)</u>	
<u>Gretchen Gottlich (g.l.gottlich@larc.nasa.gov)</u>	H
<b>*</b>	K
	· [35]

Move cursor to each item underlined in blue. An address appears in the box under the URL box.

STEP 3. To Search and Retrieve for a specific name, word, or combination of words, click on Search and Retrieve LaRC Technical Reports. The following window appears

Itrs_index index         Itrs_index	
ltrs_index	û
Langley Technical Reports Server This LTRS gateway searches citations at	
<ul> <li><u>NASA Langley Research Center</u></li> </ul>	
Specify search words.	<u>م</u>

STEP 4. Enter the name or word to be searched in the box next to the Search button on the line with the MOSAIC symbol. Enter Holland and click on Search. The following window appear

Holland (in Itrs_index)  Holland (in Itrs_index)  Holland  Holland (in Itrs_index)  Holland  Holland  Holland  Holland  Holland	
Holland	
Index ltrs_index contains the following 6 items relevant to its relative score, the second the number of lines in the item • 1000 36 <u>Internal Shock Interactions in Propulsion/A</u> <u>Sidewall Compressio</u> • 1000 29 <u>Reynolds Number And Cowl Position Effe</u> <u>Scramjet Inlet At Mach</u> • 1000 34 <u>An Experimental Parametric Study of Geom</u> <u>Specific Heats Effects</u> • 1000 36 <u>Computational Parametric Study of Sidewal</u> <u>Performance at Mach 10</u> • 1000 35 <u>Schlieren Photographs and Internal Pressun</u> <u>Sidewall-Compressio</u> • 1000 36 <u>Experimental Investigation of Generic Three</u>	n. <u>Ainframe Integrated Three-Dimensional</u> acts For A Generic Sidewall Compression <u>netric, Reynolds Number, and Ratio of</u> <u>Il-Compression Scramjet Inlet</u> <u>re Distributions for Three-Dimensional</u>

The search for Holland found 6 items on ltrs\_index

.

STEP 5. Search for wing. The following appears. Note 42 items relating to wing are found.

	Wing (in Itrs_index) 🔻	Searck Ving
L: wais://techreport:	.larc.nasa.gov/ltrs_index?Wing	
ais://techreports.larc.	nasa.gov/ltrs_index/HTML/2268	/1=blea
Ving		
dex ltrs index contain	the following 42 items velocent i	to 'Wing'. The first figure for each entry is its relative score, the second the
umber of lines in the it	m.	o wing. The mist agare for each entry is its relative score, the second the
• 1000 38 The Nat	ral Flow Wing-Design Concept	
<ul> <li>910 39 <u>Experime</u></li> </ul>	ital Effects of Wing Location on V	Wing-Body Pressures at Supersonic Speeds
• 591 38 Wind Tun	tel Investigation of the Interaction	n and Breakdown Characteristics of Slender-Wing Vortices
• 391 33 <u>Flow Field</u>	Over the Wing of a Delta-Wing F	ighter Model With Vortex Control Devices at Mach 0.6 to 1
<ul> <li>455 30 R ffect of 1</li> </ul>	Hanturm and Body on Superson	c Aerodynamics of Multibody Configurations on Propulsion Integration for a Low-Wing Transport
• 409 51 Calculation	of AGARD Vino 445 6 Plutter	Using Navier-Stokes Aerodynamics
<ul> <li>364 27 Unsteady-</li> </ul>	Pressure and Dynamic-Deflection	Measurements on an Aeroelastic Supercritical Wine
<ul> <li>364 43 <u>Experime</u></li> </ul>	tal Aerodynamic Characteristics	of a Generic Hypersonic
<ul> <li>364 34 Physical F</li> </ul>	coperties of the Benchmark Mode	els Program Supercritical Wing
• 318 32 Effects of	Forebody Strakes and Mach Num	iber on Overall Aerodynamic Characteristics of Configuration
• 318 27 Longitudi	al and Lateral-Directional Aerod	ynamic Characteristics of a Wing-Cone Configuration at
• 275 55 <u>Conical E</u>	ler Analysis and Active Roll Supp	pression for Unsteady Vertical Flows About Rolling Delta
* 227 31 Supress an	Computation of Wing-Pusciage I	ntersection Lines and Fillet Inserts With Fixed-Area Constr mic Drag-Due-to-Lift Minimization With Recommendations fo
= 227 20 A Method	for Designing Blended Wing-Boy	ly Configurations for Low Wave Drag
• 227 30 Design an	Experimental Validation of a Fl	utter Suppression Controller for the Active Flexible Wing
• 227 32 A Comput	ational and Experimental Investig	ation of a Delta Wing with Vertical Tails
<ul> <li>182 35 Wind-Tun</li> </ul>	el Investigation of Aerodynamic	Efficiency of Three Planar Elliptical Winos With Curvature
<ul> <li>136 35 <u>Application</u></li> </ul>	<u>ns of a Direct/Iterative Design Me</u>	thod to Complex Transonic Configurations
<ul> <li>136 33 <u>An Experi</u></li> </ul>	nental Investigation of a Mach 3.	0 High-Speed Civil Transport at Supersonic Speeds
• 136 40 Leanne-H	dge Vortex-System Details Obtain	ned on F-106B Aircraft Using a Rotating Vapor Screen and Su
• 91 49 <u>Actociasue</u>	desponse and stability of filtroto	ns with Elastically-Coupled Composite Rotor Blades und-Based Test Capability for Evaluating the Effect of Ra
• 91 33 Supersonic	Aerodynamic Characteristics of a	Circular Body Earth-to-Orbit Vehicle
<ul> <li>45 36 Optimizatio</li> </ul>	of Composite Sandwich Cover I	Panels Subjected to Compressive Loadings
• 45 29 Static Perfo	<u>mance of a Cruciform Nozzle Wi</u>	th Multiaxis Thrust-Vectoring and Reverse-Thrust Canabil
<ul> <li>45 27 <u>Calculation</u></li> </ul>	<u>of Unsteady Transonic Flows Wit</u>	h Mild Separation by Viscous-Inviscid Interaction
<ul> <li>45 24 <u>Trajectory I</u></li> </ul>	itting in Function Space With Ap	plication to Analytic Modeling of Surfaces
• 45 27 The NASA	angley Laminar-Flow-Control E	xperiment on a Swept Supercritical Airfoil Evaluation of I
= 43 34 <u>Design Tes</u>	and Evaluation of Three Active	Flutter Suppression Controllers mal Aerodynamic Characteristics of the X-31 Configuratio
• 45 41 Analytical a	d Evanimental Investigation of	Flutter Suppression by Piezoelectric Actuation
<ul> <li>45 35 Performance</li> </ul>	Characteristics of Two Multiards	Thrust-Vectoring Nozzles at Mach Numbers up to 1.28
+ 45 34 Evaluation	f Four Advanced Nozzle Concep	ts for Short Takeoff and Landing Performance
<ul> <li>45 26 <u>Supersonic</u>.</li> </ul>	<u><b>Aerodynamic Characteristics of a</b></u>	n Advanced F-16 Derivative Aircraft Configuration
<ul> <li>45 38 Wind Tunn</li> </ul>	l Investigations of Forebody Stra	kes for Yaw Control on F/A-18 Model at Subsonic and Tran
• 45 34 Internal Per	<u>formance of a Nonaxisymmetric 1</u>	Nozzle With a Rotating Upper Plap and a Center-Pivoted Lo
		e VTOL Unmanned Aerial Vehicle
• 45 57 Subsonic A	rodynamic Characteristics of a Pr	oposed Advanced Manned Launch System Orbiter Configurat
• 45 28 Parallel Col	ecomposition Approach to Integr Generation Algorithm for Distril	ated AerodynamioDynamioStructural Optimization of Heli
- 45 50 Farance Offi	Sanatanun Auguriunn Iur Dismi	pured memory Computers

30

STEP 6. Search for Holland or wing. The following window will appear. Note we now have 48 items - the 6 items relating to Holland and the 42 items relating to wing

Holland or Wing (in Itrs_index)
(in 🐨 Gearch) Holland or Wing
URL:  wais://techreports.larc.nasa.gov/ltrs_index?Holland+or+Wing
wais://techreports.larc.nasa.gov/ltrs_index/HTML/2232/1=blea
Holland or Wing
Index ltrs_index contains the following 48 items relevant to 'Holland or Wing'. The first figure for each entry is its
relative score, the second the number of lines in the item.
· 1000 38 The Natural Flow Wing-Design Concept
• 910 39 Experimental Effects of Wing Location on Wing-Body Pressures at Supersonic Speeds
• 591 38 Wind Tunnel Investigation of the Interaction and Breakdown Characteristics of Slender-Wing Vortices
• 591 35 Flow Field Over the Wing of a Delta-Wing Fighter Model With Vortex Control Devices at Mach 0.6 to 1
<ul> <li>500 54 Effect of Planform and Body on Supersonic Aerodynamics of Multibody Configurations</li> </ul>
· 455 30 Effect of Pylon Cross-Sectional Geometries on Propulsion Integration for a Low-Wing Transport
<ul> <li>409 51 Calculation of AGARD Wing 445.6 Flutter Using Navier-Stokes Aerodynamics</li> </ul>
· 364 27 Unstead y-Pressure and Dynamic-Deflection Measurements on an Aeroelastic Supercritical Wing
364 43 Experimental Aerod ynamic Characteristics of a Generic Hypersonic
364 34 Physical Properties of the Benchmark Models Program Supercritical Wing
· 318 32 Effects of Forebody Strakes and Mach Number on Overall Aerodynamic Characteristics of Configuration
• 318 27 Longitudinal and Lateral-Directional Aerodynamic Characteristics of a Wing-Cone Configuration at
- 273 53 Conical Euler Analysis and Active Roll Suppression for Unsteady Vortical Flows About Rolling Delta
- 273 24 Automatic Computation of Wing-Fuselage Intersection Lines and Fillet Inserts With Fixed-Area Constr
· 227 31 Survey and Analysis of Research on Supersonic Drag-Due-to-Lift Minimization With Recommendations fo
227 20 <u>A Method for Designing Blended Wing-Body Configurations for Low Wave Drag</u>
• 227 30 Design and Experimental Validation of a Flutter Suppression Controller for the Active Flexible Wing
· 227 32 <u>A Computational and Experimental Investigation of a Delta Wing with Vertical Tails</u>
• 182 35 Wind-Tunnel Investigation of Aerodynamic Efficiency of Three Planar Elliptical Wings With Curvature
136 35 <u>Applications of a Direct/Iterative Design Method to Complex Transonic Configurations</u>
136 33 An Experimental Investigation of a Mach 3.0 High-Speed Civil Transport at Supersonic Speeds
• 136 40 Leading-Edge Vortex-System Details Obtained on F-106B Aircraft Using a Rotating Vapor Screen and Su
• 91 49 <u>Aeroelastic Response and Stability of Tiltrotors with Elastically-Coupled Composite Rotor Blades</u>
• 91 30 Development of a Large-Scale, Outdoor, Ground-Based Test Capability for Evaluating the Effect of Ra
• 91 33 <u>Supersonic Aerodynamic Characteristics of a Circular Body Earth-to-Orbit Vehicle</u>
• 45 36 Optimization of Composite Sand wich Cover Panels Subjected to Compressive Loadings
• 45 38 Internal Shock Interactions in Propulsion/Airframe Integrated Three-Dimensional Sidewall Compressio
• 45 29 Reynolds Number And Cowl Position Effects For A Generic Sidewall Compression Scramjet Inlet At Mach
• 45 29 Static Performance of a Cruciform Nozzle With Multiaxis Thrust-Vectoring and Reverse-Thrust Capabil
• 45 27 Calculation of Unsteady Transonic Flows With Mild Separation by Viscous-Inviscid Interaction
• 45 24 Trajectory Fitting in Function Space With Application to Analytic Modeling of Surfaces
• 45 27 The NASA Langley Laminar-Flow-Control Experiment on a Swept, Supercritical Airfoil Evaluation of I

STEP 7. Search for Holland and wing. The following window will appear. Note: no items are found relating to Holland and wing

8	Holland and Wing (in Itrs_index) 🚛 🖉	
Ø	🖓 🟳 🞧 Holland and Wing (in 🔻 Search Holland and Wing	
U	RL: [wais://techreports.larc.nasa.gov/ltrs_index?Holland+and+Wing	
	Holland and Wing	ঐ
In S	ndex ltrs_index contains the following 1 item relevant to 'Holland and Wing'. The first figure for each entry is its relative core, the second the number of lines in the item.	
	• 0 1209 Search produced no result. Here's the Catalog for database: hrs_index	ন
4	le la	

**STEP 8.** Search for Holland and tunnel. The following window will appear. Note: 4 items are found relating to Holland and tunnel. This is a subset of the items found in Step 4

). (Cal 🖒	Holland and tunne	nel (in V Search Holland and tunnel
	binnin	
DRL : [wais://tech	ports.larc.nasa.gov/ltrs_	s_index?Holland+and+tunnet
** ** *		
Holland a		
Index ltrs_index or relative score the	ontains the following 4 ite second the number of line.	items relevant to 'Holland and tunnel'. The first figure for each entry is its
······································		ints at the testil. In of Geometric, Reynolds Number, and Ratio of Specific Heats Effects
• 1000 34 An 1		
• 1000 35 Sch	eren Photographs and Internal	al Pressure Distributions for Three-Dimensional Sidewall-Compressio
• 1000 35 <u>Sch</u> • 750 29 <u>Revu</u>	eren Photographs and Internal Ids Number And Cowl Positio	al Pressure Distributions for Three-Dimensional Sidewall-Compressio tion Effects For A Generic Sidewall Compression Scramjet Inlet At Mach
• 1000 35 <u>Sch</u> • 750 29 <u>Revu</u>	eren Photographs and Internal Ids Number And Cowl Positio	al Pressure Distributions for Three-Dimensional Sidewall-Compressio
• 1000 35 <u>Sch</u> • 750 29 <u>Revu</u>	eren Photographs and Internal Ids Number And Cowl Positio	al Pressure Distributions for Three-Dimensional Sidewall-Compressio tion Effects For A Generic Sidewall Compression Scremjet Inlet At Mach

**STEP 9.** Search for Holland not tunnel. The following window will appear. Note: 2 items are found. This is a subset of the items found in Step 5. These are the other Holland items that do not involve tunnel.

Holland not tunnel (in Itrs_index)	
😯 🐼 🕞 🙀 Holland not tunnel (in 🔻 Search Holland not tunnel	***
URL : wais ://techreports.larc.nasa.gov/ltrs_index ?Holland+not+tunnet	
Holland not tunnel	
Index ltrs_index contains the following 2 items relevant to 'Holland not tunnel'. The relative score, the second the number of lines in the item.	first figure for each entry is its
· 1000 38 Internal Shock Interactions in Propulsion/Airframe Integrated Three-Di	mensional Sidewall Compressio
<ul> <li>1000 38 Computational Parametric Study of Sidewall-Compression Scramjet In</li> </ul>	<u>let Performance at Mach 10</u>

**STEP 10.** To examine the abstract for an item listed, click on the title of the item (e.g., click on the title of item 10038 " Internal Shock ... "). The following window appears

The entire paper can be retrieved as shown in Steps 17-19.

Internal Shock Interactions in Propulsi	Search Holland not tunnel
URL: wais://techreports.larc.nasa.gov/ltrs_index/HTML/	/2221/1=bleard
Langley Technical Report Server	
1. Scott D. Holland and John N. Perkins, Internal Shock	Interactions in Pronulsion (Airframe Interacted
Three-Dimensional Sidewall Compression Scramjet   Research Center Hampton, VA 23681-0001, 1992, A Conference, July 6-8, 1992, Nashville, TN.	The late H & T & A There are DA ADAD AT A A A H
Abstract: The advantages and design requirements of number flight have led to extensive study of the three inlet in recent years. Recent research publications has number (2 to 18) in a variety of test gases, such as air experimental techniques have been employed to obta performance data and inlet starting limits. Computati for preliminary parametric studies as well as in parallu- unusual or unexpected flow phenomena. Inlets of this geometry while producing a highly complex, three-di shock/shock and shock/boundary layer interactions. W high speed inlet interactions is recognized, the present inviscid effects of leading edge sweep, sidewall compre- internal shock structure in terms of inlet compression the Mach number invariance with leading edge sweep inlet is identified, and a mean surface with leading edge sweep	e-dimensional sidewall compression scramjet ve indicated testing over a broad range of Mach r, helium, and tetrafluoromethane. Multiple ain detailed internal shock interaction data ional fluid dynamics has been effectively used el with experiments to aid in the explanation of s genre afford a relatively simple, generic imensional flow field dominated by While the importance of the viscous effects in t work addresses in a parametric fashion the ression, and inflow Mach number on the

Step 11. Examine an html document. Search for Storaasli. The following appears.

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	ic Structural Analysis and Vil		

Note 3 items relating to Storaasli are found.

Step 12. Click on "Computational Mechanics Analysis Tools for Parallel-Vector Supercomputers". The following appears.

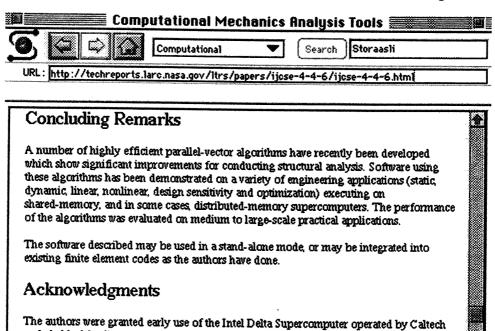
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Notice on the line under the Mosaic symbol the following appears http://techreports.larc.nasa.gov/ltrs/papers/ijce-4-4-6/ijcse-4-4-6.html This is an **html** document. Click on the title. A **Table of Contents** appears.

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Computational Mechanics Analysis Tools for	
Parallel-Vector Supercomputers	
O. O. Storaadd D. T. Heuven, M. A. Baddourab, and J. Qin	
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STEP 13. Go to any section of the document by clicking on that item. Click on Concluding Remark



on behalf of the Concurrent Supercomputing Consorium.

Click on left arrow and you will return to the Abstract entry. If you click on the title, you return to the **Concluding Remarks.** This is a limitation on the **MAC** version of an **html** document. It is better to use the scroll bar to navigate through an **html** document.

STEP 14. Notice on the Table of Contents an entry labelled

**Postscript Version of Report** 

First go to OPTIONS on the menu bar and enable

Zeferences

LOAD to Disk

Now click on the entry

**Postscript Version of Report** 

A window will appear

#### **Discard Resource Fork: MosaicFile.Z**

Click the OK box. Your PostScript version is called MosaicFile.Z and is found on your hard disk. Go to OPTIONS on the menu bar and enable

Turn off Load to Disk

To obtain a copy on your local printer follow STEPS 19 and 21 (or STEPS 19A and 21A).

STEP 15. Go back to the page headed LTRS--Langley Technical Report Server. This can be down by several methods

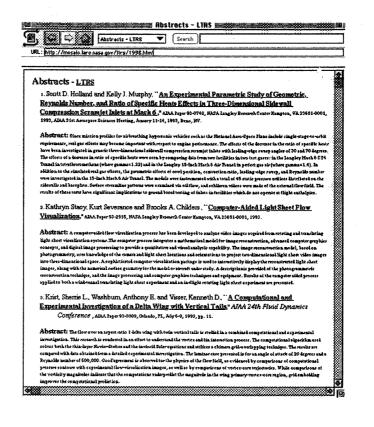
Method 1. Click on the House symbol which takes you back to the home page. Then click on the right arrow symbol.

Method 2. Click on the left arrow symbol until the page appears

Method 3. Go to the box next to the house symbol and hold down the mouse button.

Several labels appear. Move up to the label LTRS -- Langley Technical Report Server (LTRS)

STEP 16. To examine the abstracts by year click on a year (e.g., 1993). All the abstracts for that year appear (as shown below)



STEP 17. To bring up a full report, first go to OPTIONS on the menu bar and enable

LOAD to Disk

STEP 18. Click on any report you want to examine. A window appears and asks you to save the file and name it. You may choose any name xxxxx but you must use the .Z extension

#### xxxxxx.Z

The Z extension is necessary since the reports are in compressed format and need to be uncompressed. By default this file will be found in your Mosaic folder. Go to **OPTIONS** on the menu bar and enable

#### Turn off Load to Disk

STEP 19. To uncompress the file xxxxx.Z. Go to your Tools for Mosaic folder. Drag the xxxxx.Z icon so it is on the MacGzip icon. The following window appears.

#### gzip: xxxxxx.Z -> xxxxxx

The xxxxxx.Z file is replaced by xxxxxx. To obtain a copy of the report on your local printer go to STEP 21.

#### Note: STEPS 18A and 19A are alternatives to STEPS 18-19. You may skip Steps 18A-19A.

STEP 18A. Click on any report you want to examine. A window appears and asks you to save the file and name it. You may choose any name xxxxx but you must use the .Z extension

#### xxxxxx.Z

The Z extension is necessary since the reports are in compressed format and need to be uncompressed. By default this file will be found in your Mosaic folder. Go to **OPTIONS** on the menu bar and enable

#### **Turn off Load to Disk**

STEP 19A. To uncompress the file xxxxx.Z. Go to your Mosaic folder and double click on MacCompress3.2. A Progress window appears. Go to FORMAT on menu bar and enable

#### Unix compress

Go to FILE on menu bar and enable

#### **Decompress file**

All the files in the Mosaic folder appear. Select the file you want to decompress (in our case xxxxx.Z) and click open. You can watch the file decompression in the Progress window. xxxxx.Z file is replaced by xxxxxx in your Mosaic folder. Quit MacCompress3.2.

STEP 20. To view the document xxxxx, double click on MacGS 2.5.2 $\beta$ 2 Runtime f folder in your Mosaic folder. Double click on Ghostscript 2.5.2 $\beta$ 3. A window labelled Ghostscript 2.5.2 $\beta$ 3 will appear. In the background a large window labelled Graphics appears. On the menu bar under

#### MacGS

choose

#### **Open file**

Go back to the Mosaic folder where you saved the file created in STEP 19 (or STEP 19A) and open this file xxxxxx. On the menu bar under

#### MacGS

If under MacGS you choose

#### **Graphics window**

the report is placed in the front window on your screen.

If your cursor becomes a fat cross when placed in the Graphics window, you can advance through the report by



#### selecting the apple R key combination (or Resume under MacGS)

You cannot go backwards in the report.

If your cursor becomes a thin cross when placed in the Graphics window, you cannot advance through the report.

This report falls in this category. The entire report can be printed as shown in STEP 17

Repeat STEPS 11-17 but this time examine the abstracts in 1994. This time choose the first paper by Walsh, et al "A Multilevel Approach ...". The cursor is a fat cross . Advance through this report using the apple R key combina-

tion (or **Resume** on **MacGS** menu bar).

STEP 21. To print the report on your local printer, do the following.

Go to your **Tools for Mosaic** folder. Drag the **xxxxxx** icon so it is on the **Drop.PS** icon. The following window briefly appears

Waiting for "your printename"

The following window appears until the document is finished printing

Sending xxxxx

STEP 21A is an alternative printing method. You may skip Step21A.

**STEP 21A** To print the report on your local printer, do the following.

Double click on your Laser Writer Utility so that you can down load a PostScript file.

On the menu bar under Utilites choose

Download PostScript File ...

Now double click on the PostScript file you want to print - in this case

XXXXXX

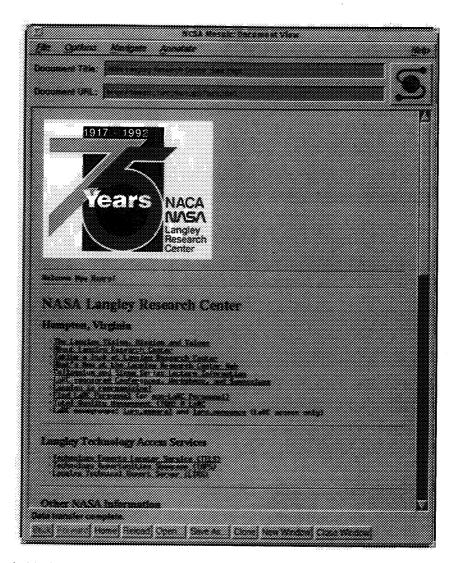
A window appears asking

#### Save PostScript output as

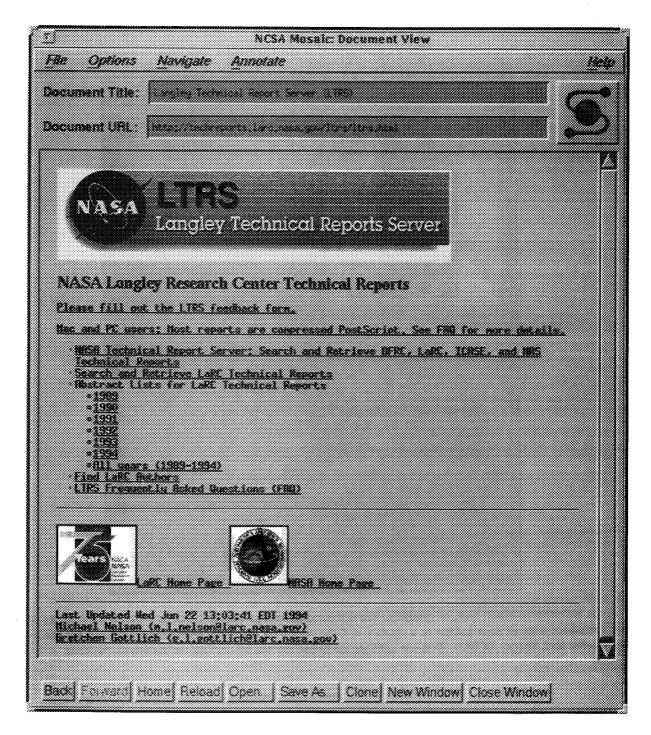
Choose OK or change the name to something else. Errors at printing are saved in this file. If no errors, the file is not saved.

## Instructions for Using LTRS on the UNIX

STEP 1. Open a shell tool and type xmosaic. If you have the NASA Langley Home Page as your default, then the following appears on your screen.



Items are either in black, blue, or symbols. Move the cursor over an item in black, and the cursor remains the same. Move the cursor over an item in blue or a symbol, and the cursor becomes a pointing hand. These items are hypertext links to other text, images, or files. You can activate the hypertext link by clicking the mouse on the item. STEP 2. Click on LTRS. The following window appears:



Move the cursor to each underlined item in blue. An address appears at the bottom of the page above the menu buttons.

**STEP 3.** To search and retrieve a document with a specific name, word, or combination of words, click on Search and Retrieve LaRC Technical Reports. The following window appears:

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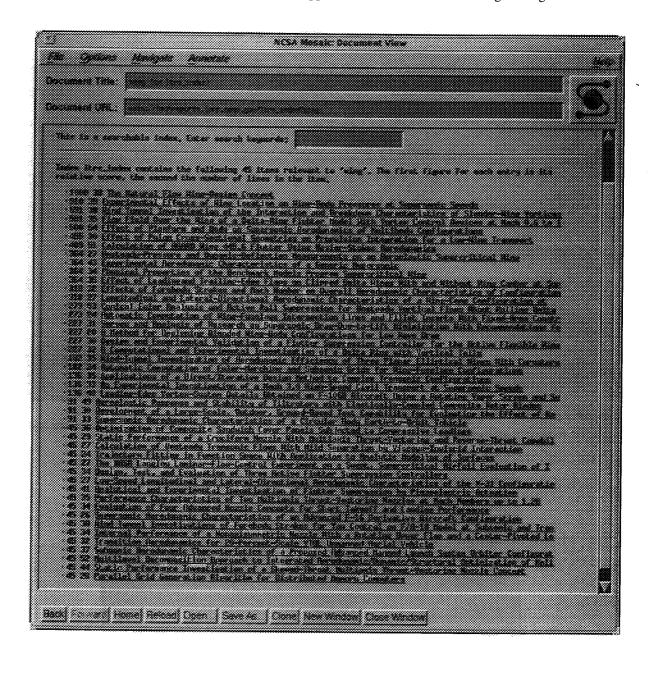
STEP 4. Enter the name or word to be searched in the box and select return. For example, search for Holland and the following window appears:

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The search for Holland found 6 items in the LTRS index.

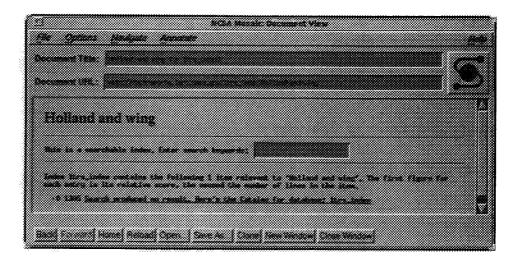
STEP 5. Search for wing. The following window appears with 46 items found relating to wing.



**STEP 6.** Search for Holland or wing. The following window appears. Note we now have all items relating to Holland and all items relating to wing.

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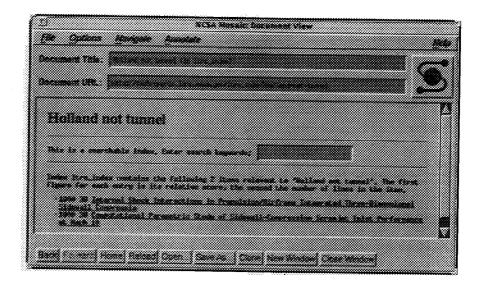
STEP 7. Search for Holland and wing. The following window appears. Note no items are found relating to Holland and wing.



**STEP 8.** Search for Holland and tunnel. The following window appears. Note four items are found relating to Holland and tunnel. This is a subset of the items found in STEP 4.

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STEP 9. Search for Holland not tunnel. The following window appears. Note two items are found. This is a subset of the items found in STEP 5.



**STEP 10.** To examine the abstract for an item, click on the title of the item (e.g., click on the title of item 10038 "Internal Shock . . . "). The following window appears.

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**STEP 11.** To examine an html document, first click on the back button at the bottom of the page. Then, search for Storaasli. The following window appears.

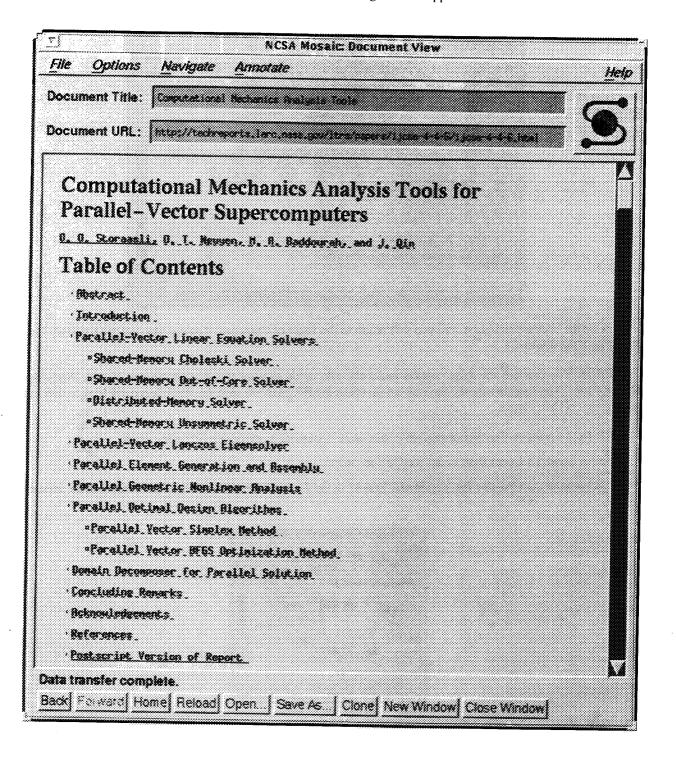
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STEP 12. Click on "Computational Mechanics ... Supercomputers." The following window appears:

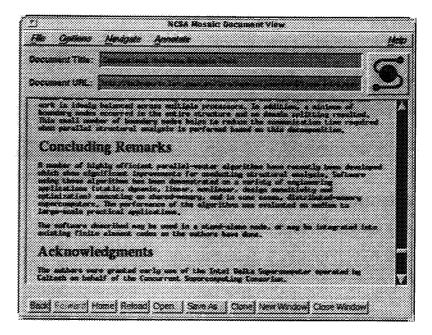
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*STEP 13.* Note when you place the cursor over the title, the following appears at the bottom of the page: http://techreports.larc.nasa.gov/ltrs/papers/ijce-4-4-6/ijcse-4-4-6.html

This is an html document. Click on the title and the following window appears:



*STEP 14.* You can go to any section of the document by clicking on the item in the Table of Contents. For example, click on **Conluding Remarks**.



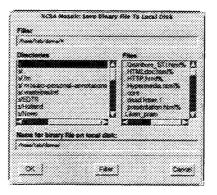
Click on the back menu button and you will return to the Table of Contents. You can also use the scroll bars to navigate through the document.

STEP 15. You can use the Print option under the File menu to print this html document in text, PostScript, or HTML format. You can also use the Save as option under the File menu to save this html document to your disk in text, PostScript, or HTML format.

STEP 16. To print the PostScript version of this html document, perform the following steps:

1. Select Load To Local Disk under the Options menu.

2. Click on the item PostScript Version of Report in the Table of Contents and the following window appears.



3. Type in any name for the file along with the extension .ps.Z. For example, name the file Storaasli.ps.Z and select ok.

4. Open a shell tool and type uncompress Storaasli.ps.Z and press return.

5. Type lpr -Pprintername Storaasli.ps and press return.

6. To return to the page entitled *LTRS* -- *Langley Technical Report Server*, either select the select the back button until the page appears.

**STEP 17.** To examine the abstracts by year, click on a year (e.g., 1993). All the abstracts for that year appear in the window, as shown below.

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**STEP 18.** To view a report, scroll down until you find the report that you want to examine (e.g., Genopersisting the System), then select the title of the report. Mosaic opens the report in the application GhostView. Because not all PostScript reports are viewer friendly (but all are printer friendly), you may not be able to view the report. If the report is viewable, you can perform the following functions in GhostView.

 1. If page numbers appear next to the menu, you can highlight the page number and then
 select

 Next under the Page menu to go to that page. If page numbers do not appear, you
 can go to the next page by

 selecting Next under the Page menu. (The symbol < to the right of a page number indicates the current page and the symbol \* to the left of a page number indicates a marked page.)</td>
 of a page number indicates the current page and the symbol \* to the left of a page number indicates a marked page.)

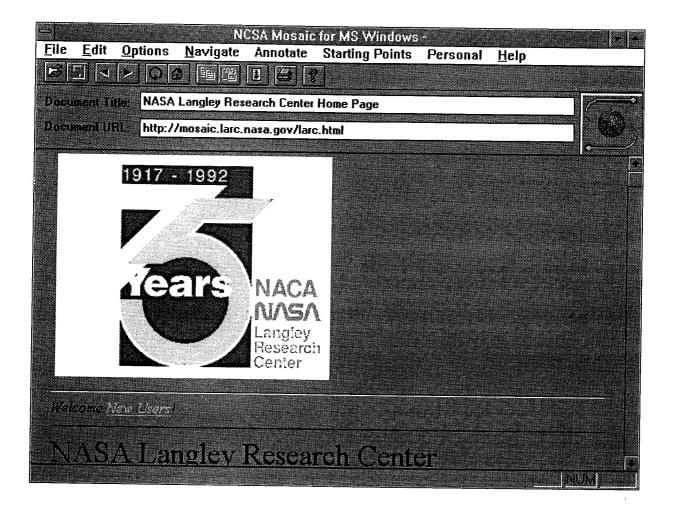
2. If page numbers appear next to the menu, you can highlight the page number and then select **Mark** under the **Page** menu. Then, you can select **Print Marked Pages** or **Save Marked Pages** under the **File** menu. If page numbers do not appear, then you can go to a page and select **Print** under the **File** menu to print that page.

2. You can select a number under **Magstep** to change the size of the page or select an option under **Orientation** to change the orientation. (These options may distort the image.)

GenoperTheSys.Final	Chatteriew, sees (or 1.3	1
Monday, June 27, 199/ (277, 521)	<i>i</i>	
File 1		
Page *3		
Magstep 5 6		
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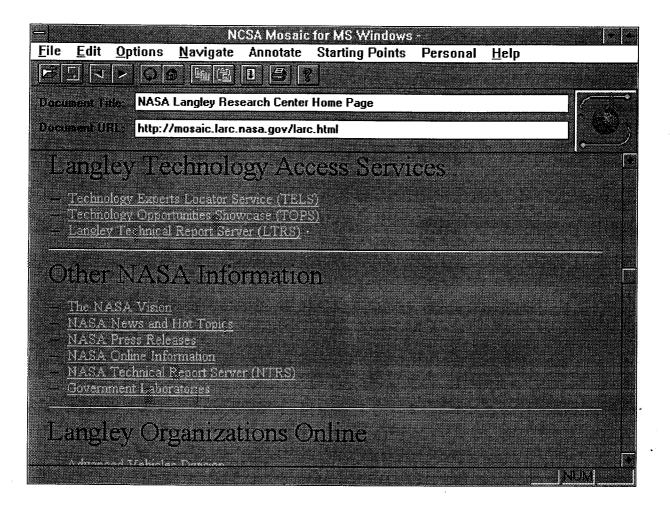
Instructions for Using LTRS on the PC

STEP 1 Double click on the Mosaic icon in Program Manager. If you have the NASA Langley Home Page as your default, you will see the logo for the Center's 75th Anniversary. If you do not have this as your default, use the following URL to access the LaRC Home Page: HTTP://MOSAIC.LARC.NASA.GOV/LARC.HTML



Items appear in either black or blue letters. Move the mouse pointer to an item in black, and the arrow remains the same. Move the pointer to an item in blue, and the arrow becomes a pointing hand. When this occurs you can activate the item pointed to by clicking once. With some monitors, rather than blue letters, the hypertext linked items will be underlined.

STEP 2 Scroll or page down until you see the section for LANGLEY TECHNOLOGY ACCESS SERVICES. Click once on: LANGLEY TECHNICAL REPORT SERVER (LTRS).

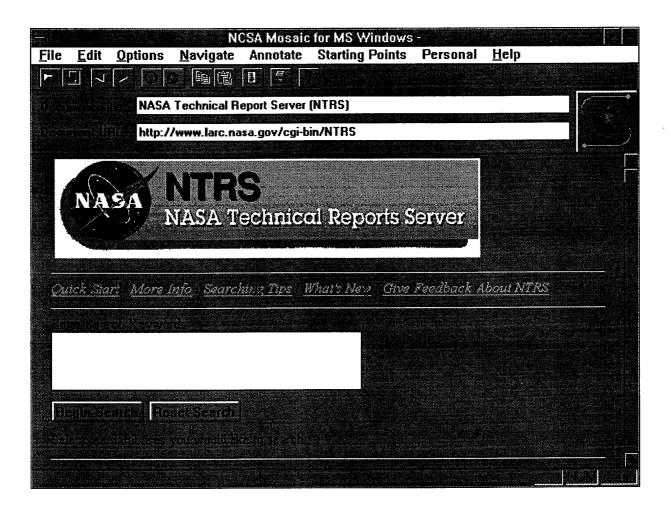


ONGINAL PAGE IS OF POOR QUALITY STEP 3 Click once on NASA TECHNICAL REPORT SERVER: SEARCH AND RETRIEVE DFRC, LARC, ICASE, AND NAS TECHNICAL REPORTS.

- NCSA Mosaic for MS Windows -	
<u>File Edit Options Navigate Annotate Starting Points Personal H</u> elp	
Bocsment Title: Langley Technical Report Server (LTRS)	C.
Document URL: http://techreports.larc.nasa.gov/ltrs/ltrs.html	
NASA Langley Research Center Technical Report	
Please fill out the LTRS feedback form	
Mac and PC users. Most reports are compressed PostScript. See FAQ for more details	
<ul> <li><u>MASA Technical Report Server, Search and Retrieve DFRC, LaRC, ICASE, and MAS</u></li> <li><u>Search and Retrieve LaRC Technical Reports</u></li> <li><u>Abstract Lasts for LaRC Technical Reports</u></li> <li><u>1989</u></li> <li><u>1990</u></li> <li><u>1001</u></li> </ul>	

NOTE: Access to NAS reports is restricted to \*.nasa.gov users.

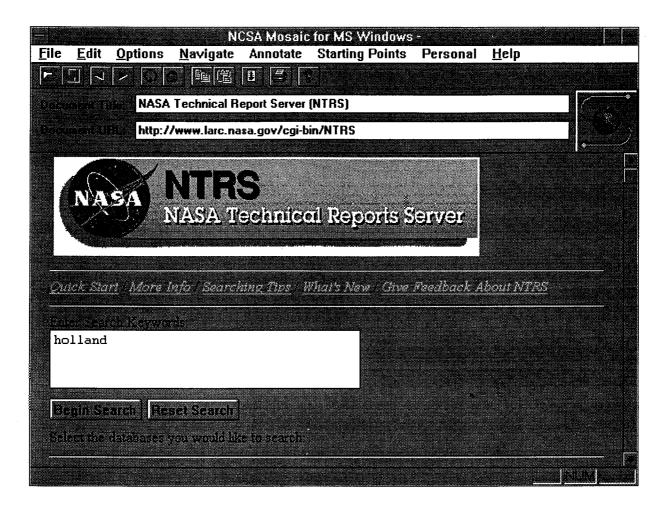
## STEP 4 The following search screen will display.



STEP 4 (Con't.) Scroll down to see a list of databases available for searching. Note, by default, three databases are already marked for searching. For this example, leave the defaults in place. If you want to make changes in the future, click once on the box to the left to select or deselect the database[s] to be searched.

NCSA Mosaic for MS Windows -	
<u>File Edit Options Navigate Annotate Starting Points Personal Hel</u>	<u>p</u>
Document Title NASA Technical Report Server (NTRS)	
Document URL: http://www.larc.nasa.gov/cgi-bin/NTRS	
Enter Search Keywords	
Begin Search Reset Search	
and the second	
Select the databases you would like to search	
- Mannes Research Center - Numerical Aerodynamic Simulation Division (NAS)	
— 🖾 Dayden Flight Research Center	
ICASE Institute for Computer Applications in Science and Engineering	
<ul> <li>Z Langley Research Center</li> <li>RECON detenses - abstracts only (NASA STD)</li> </ul>	
SCAN Selected Current Aerospace Notices - abstracts and (NASA STI)	
STELAR Project - abstracts only (Couldard Space Fight Center)	

STEP 5 Scroll back up if necessary. Point and click on the white box labelled: Enter Search Keywords. For this example, enter the name holland in the box. To start the search process, click once on Begin Search.



# The search for **holland** finds 6 items in the Itrs\_index, and none in either NAS or Dryden. Scroll down to see the 6 items listed from the Langley server. STEP 6

		N	CSA Mosai	c for MS V	lindows			
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cument T	ale NASA	Technical R	eport Servei	t (NTRS)				
cunent t	AL: http://	/www.larc.na	sa.gov/cgi-l	bin/NTRS?s	search_w	ords=holland	&nas=on&dfrc	-
en e		is relative sc					nd. The first	
			shons in Pro	pulsion/Air	frame Int	egrated Thr	ee-Dimensio	<u>nd</u>
<u>.510EW</u>	all Compacs Reynolds		d Cowl Pos	ition Effect	s For A (	Generic Side	wall Compre	ssion
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	all Compres							
			ation of Ger	ienc Three	Dimensi	onal Sidewa	ll-Compressu	m
	get Infeis at							

STEP 7 Using the mouse, point and click once on the first title listed, Internal Shock Interactions in Propulsion/Airframe Integrated Three-Dimensional Sidewall Compressio. . .

A complete bibliographpic citation and abstract will display.

— NCSA Mosaic for MS Windows -	
<u>File Edit Options Navigate Annotate Starting Points Personal Help</u>	
Document Title Internal Shock Interactions in Propulsion/Airframe Integrated Three-Dimensiona	
http://www.larc.nasa.gov:81/blearg.larc.nasa.gov:210/ltrs_index/HTML/2221/	÷
Langley Technical Report Server	
1. Scott D. Holland and John N. Perkov, <u>Internal Shock Interactions in</u> Propulsion/Airframe Integrated Three-Dimensional Sidewall Compression Scramj	
Inlets, ALAA Paper 92, 5092, MASA Langing Brassron Center Hampton, VA 23681-00	
1997. ALAA/SAE/ASME/ASEE 28th John Promision Conference, July 6-4, 1992. Mashall	
Abeta set. The advantages and design requirements of propulsing additioner integration for b Much minimer their have led to extensive study of the three dimensional sidewall completes	
The second sub-transported years. Refer insection publications have subcated testing over store starts of Machineshier (216,16) and vanety of early after such as in fielders and	
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the dynamic cluss been effectively used for preliminary parametric studies as well as in parallel	
<ul> <li>experiments to aid in the explanation of unusual or interpreted flow phenomenal interval in second afford a relatively simple, generic geometry while probtoms a highly complex.</li> </ul>	
These differentiations they field dominated by third and the solution adopted in the solution of the solution	

STEP 8 Find the 'less than' symbol (<) which appears third from the left on the top button bar. Clicking on this button will usually move you back one screen. In this example, click on this symbol to return to the search screen.

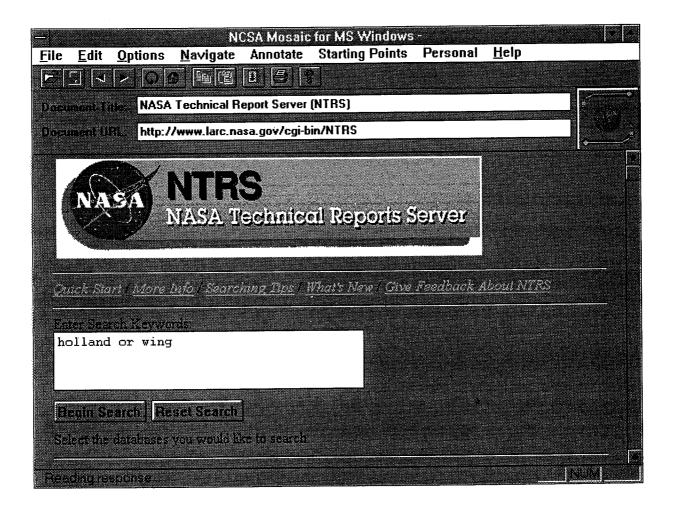
— NCSA Mosaic for MS Windows -	
<u>File E</u> dit <u>O</u> ptions <u>N</u> avigate Annotate Starting Points Personal <u>H</u> elp	
Document Title: Internal Shock Interactions in Propulsion/Airframe Integrated Three-Dimensiona	/ <b>1</b> 44
Document LIRL http://www.larc.nasa.gov:81/blearg.larc.nasa.gov:210/ltrs_index/HTML/2221/	
Angley Technical Report Server	•
1 Scott D. Holland and John N. Perkins, "Internal Shortk Interactions in	
Propulsion/Airframe Integrated Three-Dimensional Sidewall Compression Scramjet	
Inlets," AIAA Paper 92-3099, NASA Langley Research Center Hampton, VA 23681-0001, 1992, AIAA/SAE/ASME/ASEE 28th Joint Propulsion Conference, July 6-8, 1992, Nashville,	
TN	
Abstract: The advantages and design requirements of propulsion/airframe integration for high	
Mach number flight have led to extensive study of the three-dimensional sidewall compression	
scrampet inlet in recent years. Recent research publications have indicated testing over a broad range of Mach number (2 to 18) in a variety of test gases, such as air, helium, and	
tetrafluoromethane. Multiple experimental techniques have been employed to obtain detailed	
uternal shock interaction data, performance data, and inlet starting limits. Computational fluid	
dynamics has been effectively used for preliminary parametric studies as well as in parallel with	h
experiments to aid in the explanation of unusual or unexpected flow phenomena. Inlets of this	
genre afford a relatively simple, generic geometry while producing a highly complex,	
three-dimensional flow field dominated by shock/shock and shock/boundary layer interactions	
While the importance of the viscous effects in high speed inlet interactions is recognized, the	
nearest words addresses in a nearmatic fashion the imposid effects of tending edge sween	

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STEP 9 Mosaic will search using the Boolean operators, AND, OR and NOT. Search for holland or wing. This search looks for all citations which contain either the term holland or the term wing. The items do NOT have to contain both terms.



3.1

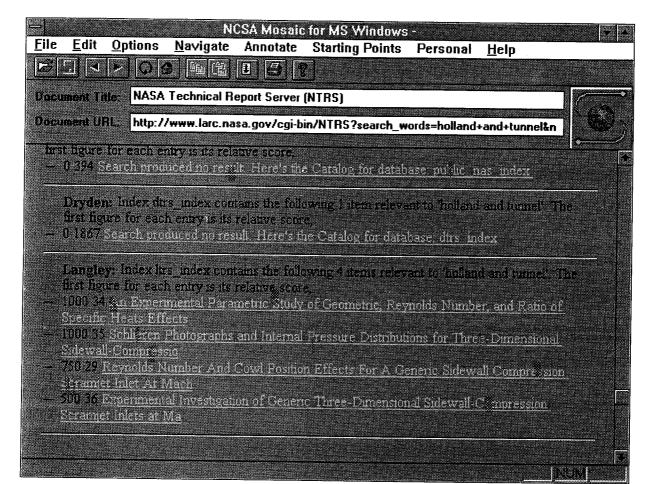
STEP 9 (Con't.) When we searched for the single term, holland, the result was 6 hits. If we had searched for wing we would have found at least 46 hits in the database. Because we have broadened the search using the "OR" operator, the results for holland or wing is 52 titles.

NCSA Mosaic for MS Windows -
<u>F</u> ile <u>E</u> dit <u>O</u> ptions <u>Navigate</u> Annotate Starting Points Personal <u>H</u> elp
Document Title: NASA Technical Report Server (NTRS)
Document URL: http://www.larc.nasa.gov/cgi-bin/NTRS?search_words=holland+or+wing&nas=
Langley index itrs made contains the following of memory is want to helland or wang. The first
figure for each entry is its relative score
- 1000 38 The Matural Flow Wing-Design Soncept
910 39 Experimental Effects of Wing Location on Wing-Body Pressures at Supersonic Speeds
591-38 Wind Tunnel Investigation of the Interaction and Breakdown Characteristics of
Slender-Wing Vortices
591 35 Flow Field Over the Wing of a Delta-Wing Fighter Model With Vortex Control Devices
at Mach 0.6 to 1
<ul> <li>500 54 Effect of Planform and Body on Supersonic Aerodynamics of Multibody Configurations</li> <li>455 30 Effect of Pylon Cross-Sectional Geometries on Propulsion Integration for a Low-Wing</li> </ul>
Transport
489 St Calculation of AGARD Wing 445.6 Flutter Using Navier-Stokes Aerodynamics
364.27 Unsteady-Pressure and Dynamic-Deflection Measurements on an Aeroelast
Supercritical Wing
- 364 🖉 Experimental Aerodynamic Charactenstics of a Generic Hypersonic
— 364 34 Physical Properties of the Benchmark Models Program Supercritical Wing
364 35 Effect of Leadingand Trailing-Edge Flaps on Clipped Delta Wings With and Without
Wing Camber at Sup

STEP 10 Return to the search screen using the < symbol. Search for holland and wing. The search will look for all citations which contain both terms. Note we have narrowed the search so much that it finds NO hits in any of the three databases.

- NCSA Mosaic for MS Windows -	
<u>File E</u> dit <u>O</u> ptions <u>N</u> avigate Annotate Starting Points Personal <u>H</u> elp	
Document Title NASA Technical Report Server (NTRS)	*
Document URL: http://www.larc.nasa.gov/cgi-bin/NTRS?search_words=holland+and+wing&nas	8
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Return to NTRS	
Searching databases for word(s) kalland and wing	
and a standard and many the following to real entering the ballood and many The first	-
NAS: Index public nas index contains the following Litem relevant to 'hollond and wing'. The first figure for each entry is its relative score.	
0 394 Search produced no result. Here's the Catalog for database public nas index	
Dryden: index drs meet contains the following 1 dem relevant to 'holland and wing'. The first	
figure for each entry is its relative score,	
9 1867 Search produced no result. Here's the Catalog for database: dtrs_index	_
Langley: Index lits_index contains the following I item relevant to 'holland and wing'. The first	
figure for each entry is its relative score,	
1 1360 Search produced no result. Here's the Catalog for database. hts index	
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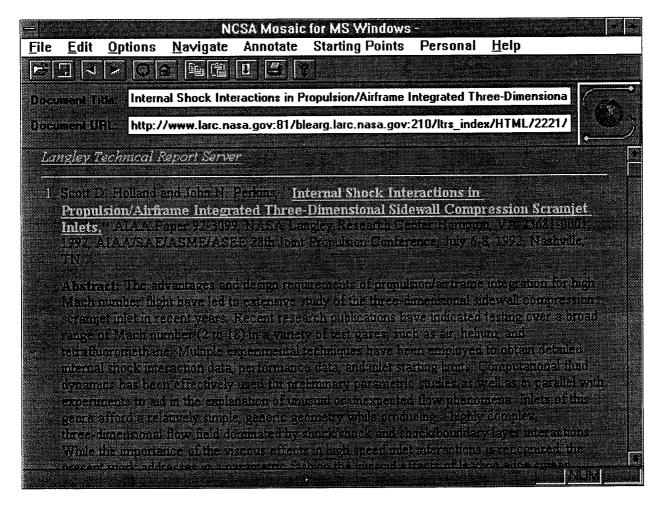
STEP 11 Return to the search screen using the < symbol. Try the AND operator again. This time search for **holland and tunnel**. The search results in 0 hits for NAS and Dryden, but 4 hits in the index to the Langley database. All 4 items have both the term **holland** and **tunnel** located somewhere in the bibliographic description or abstract.



STEP 12 Return to the search screen using the < symbol, and search for holland not tunnel. No items are located in either NAS or Dryden, but a total of 2 items are found in the Langley database. These records contain the term holland but do NOT contain the term tunnel anywhere in the bibliographic citation or abstract.

NCSA Mosaic for MS Windows - <u>File E</u> dit <u>O</u> ptions <u>Navigate</u> Annotate Starting Points Personal <u>H</u> elp
Document Fille: NASA Technical Report Server (NTRS)
Bocument LIRI: http://www.larc.nasa.gov/cgi-bin/NTRS?search_words=holland+not+tunnel&na
Ketum to NIKS
Searching databases for word(s) kolland not cannel
NAS: Index public nas index contains the following 1 item relevant to 'follond not monel'. The first figure for each entry is its relative score. — 0 394 Search produced no result. Here's the Catalog for database: public nas index
Drytien: Index drs_mdex contains the following Litem relevant to 'holland not tunnel. The first- figure for each entry is its relative score, - 0 1847 <u>Search produced no result. Here's the Catalog for databases drs_index</u>
Langley: Index Itrs_index contains the following 2 items relevant to 'holland not tunnel" The first figure for each entry is its relative score. — 1000 38 Internal Shock Interactions in Propulsion/Airframe Integrated These-Dimensional Sidewall Compressio — 1000 38 Computational Parametric Study of Sidewall-Compression Scramiet Inlet Performance at Mach 10
http://www.lerc.nasa.gov/81/blearg.larc.nasa.gov/210/ltrs_index/HTML/2221/1=blearg%NUM

## STEP 13 Click once on the first Langley title, INTERNAL SHOCK INTERACTIONS... After a brief pause, the full bibliographic citation and abstract for this title will display.



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## THE PROCESS OF DOWNLOADING AND PRINTING THE FULL TEXT OF THE REPORT IS COMPOSED OF SEVERAL STEPS WHICH FOLLOW ON THE NEXT FEW PAGES

STEP 14 Begin by moving the cursor to the top pull-down menu bar and click on OPTIONS. Next, click on LOAD TO DISK which is the very first item under the OPTIONS pull-down menu.

- NCSA Mosaic for MS Windows -					
	arting Points Personal <u>H</u> elp				
E Load to Disk					
✓ Show <u>T</u> oolbar ✓ Show <u>S</u> tatus Bar Document UI ✓ Show Current URL/Title	sion/Airframe Integrated Three-Dimensiona larc.nasa.gov:210/ltrs_index/HTML/2221/				
Langley 7 ✓ Show Anchor URLs ✓ Change Cursor Over Anchors					
Propu Propu Inlets, Show Group Annotations 1992, ↓ Use 8-bit sound	al Shock Interactions in ensional Sidewall Compression Scramjet Research Center Hangaton, VIA 23681-0001 milator Conference, July 6-8, 1992, Nashville,				
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scramiet inlet in recent years. Recent research range of Mach miniber (2 to 18) in a variety of tetrafluoromethane. Multiple experimental techn internal shock interaction data, performance data	publications have indicated testing over a broad test gases, such as air, helitim, and igues have been employed to obtain detailed a and inter starting linus. Computational fluid ary parametric studies as well as in parallel with or unexpected flow phenomena. Inters of this ry while producing a highly complex, whick and shock/houndary layer interactions.				

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STEP 15 Click on the title of the report you wish to retrieve. In this example, click once on the title, **INTERNAL SHOCK INTERACTIONS...** 

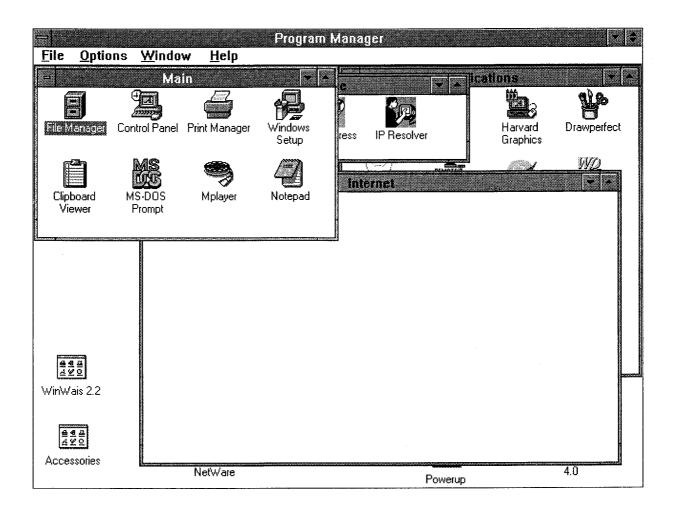
When you do so, a SAVE AS window will open. The file name of the selected report will already be listed as File Name. The file must be stored on a drive with read/write capability. For this example, the Directories should be set to c:\data\www.

Click on OK. The bottom of the screen will display a message similar to the following:

# TRANSFERING AIAA-92-3099.PS.Z 410,000 BYTES

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<u>File E</u> dit	<u>Options</u>	<u>N</u> avigate	Annotate	Starting F	<sup>o</sup> oints	Personal	Help	
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## STEP 16 Toggle in Windows to move to **PROGRAM MANAGER**. Next click twice on **FILE MANAGER** which is located inside the icon labelled **MAIN**.



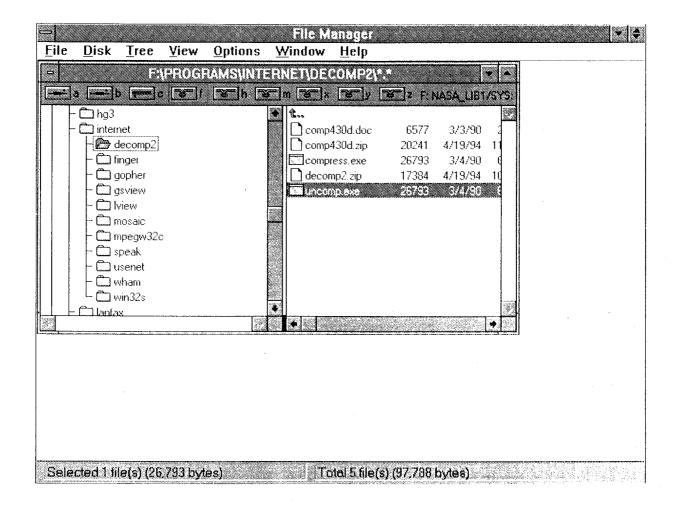
### STEP 17 With **FILE MANAGER** now open, notice the file you captured/downloaded from Mosaic is listed on the righthand side as AIAA-92-.Z

It is located in the C:\DATA\WWW subdirectory.

You will need to remember the name of this file as you proceed to the next steps to decompress, view and print the report.

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STEP 18 Within FILE MANAGER, change to f:\programs\internet\dcomp2 subdirectory. On the righthand side of the window, click once on the uncomp.exe file.



STEP 19 Click once on the pull-down menu for FILE. Next, click once on the RUN command.

⊐ ≣lle <u>D</u> isk <u>T</u> ree	<u>V</u> iew <u>O</u> ptions	File Manager <u>W</u> indow <u>H</u> elp		•
Open         Move         Copy         Delete         Rename         Properties         Run         Print         Associate         Create Directory         Search         Select Files         Exit		ERNET\DECOMP2\*.*	3/3/90 2 4/19/94 11 3/4/90 6 4/19/94 10	
Selected 1 file(s) (26.7	83 human	Totel \$ tile(s) (97.78)		

STEP 20 When the RUN window opens, the Command Line reads:

#### UNCOMP.EXE

Click once on the Command Line box and type in the name of the file. The line should then read:

UNCOMP.EXE c:\data\www\aiaa-92-.z

Click once on **OK**.

← File M <u>File Disk Tree View Options Wi</u> ndow	anager Help
Run Current Directory: F:\PROGRAMS\DECOMP2 Compand Line:	OK         F: NASA_LB1/SYS           OK         77           77         3/3/90
Run Minimized	41 4/19/94 11 93 3/4/90 6 84 4/19/94 10 mp.exe 26793 3/4/90 6
UNCOMP.EXE c:\data\www\aiaa-92z  Run Minimized  Gamma for a for	
Selected 1 file(s) (26 793 bytes)	stel 5 tile(s) (97,783 bytes)

STEP 21 After executing the RUN command on UNCOMP.EXE, the screen will change to black for a few seconds before returning to Windows. At this point change to the c:\data\www subdirectory and examine the files. The file AIAA-92-.Z has changed to an unzipped/uncompressed file labelled AIAA-92-. You may also notice that since it is now an uncompressed file, it is much larger in size than previously.

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STEP 22

Change to the **f:\programs\internet\gsview** subdirectory. On the righthand side of the screen, move the cursor to the **gsview.exe** file and click twice to start the Ghost View program which will allow you to view and print the report.

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STEP 23

Once in Ghost View, click once on the **FILE** pull down menu. Next click once on the **OPEN** command which is the first command on the pull down menu. Finally, make sure the drive is set to **c:\data\www** and the file name to **aiaa-92-.** Click once on **OK**.

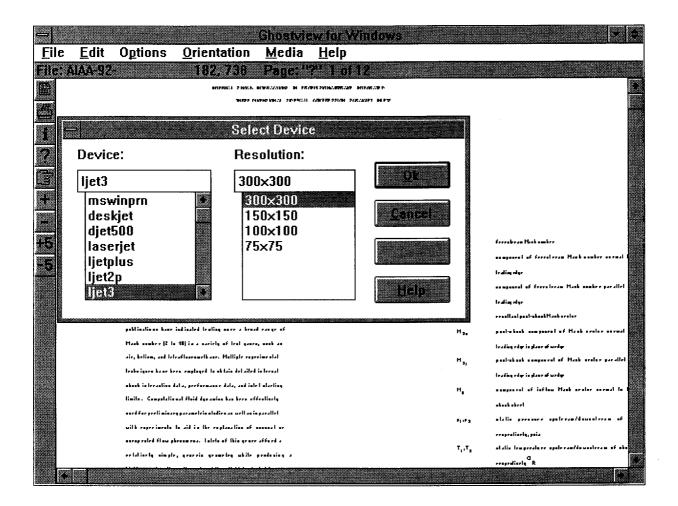
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STEP 23 (Con't.) After a brief delay, the first page of the report will appear on the screen. The text may or may not be legible.

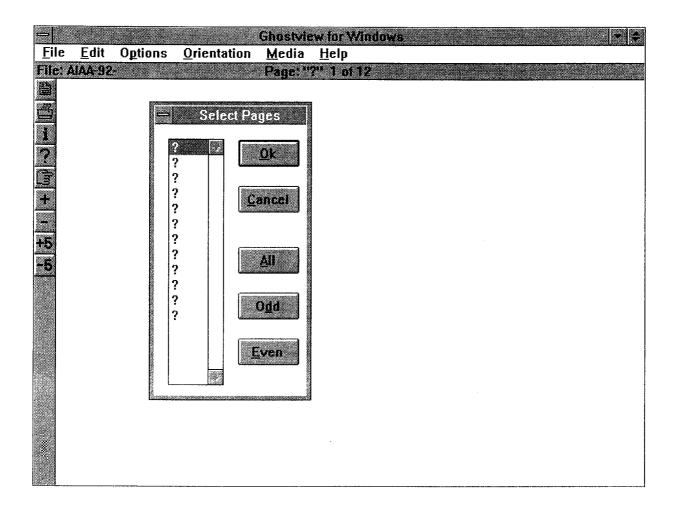
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ORIGINAL PAGE IS OF POOR QUALITY STEP 24

To print the report, click once on the printer icon on the upper lefthand side of the screen. When you do so, a **SELECT DEVICE** window will open. With the **Device** set at **ljet3** and the **Resolution** set at **300X300**, click once on **OK**.



ORIGINAL PAGE IN OF POOR QUALITY STEP 25 The **SELECT PAGES** window will open. With the cursor on the first ? mark, click on **OK**. This will send a command to print out only the first page of the report.



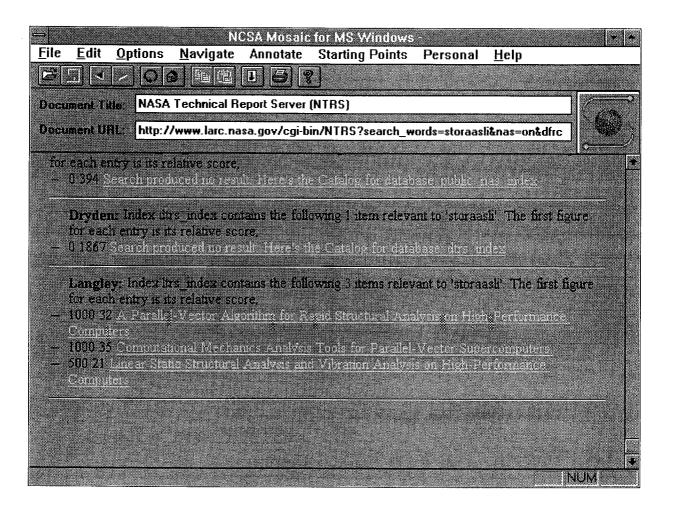
STEP 26 The **SELECT PRINTER PORT** window will open. Point to LPT2: and click on **OK**.

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Retrieve the printout from the printer.

#### THE NEXT FEW STEP WILL GUIDE YOU THROUGH SEARCHING AND VIEWING HTML DOCUMENTS WHICH ARE FULLY VIEWABLE ONLINE AND HAVE HYPERTEXT LINKS

STEP 27 Toggle in Windows to return to Mosaic. Return to the search screen and search for the name **Storaasli**. The search finds 3 titles in Langley's index.



### STEP 28

Click once on **Computational Mechanics Analysis Tools for Parallel-Vector Supercomputers**. The bibliographic citation and abstract for this paper will display.

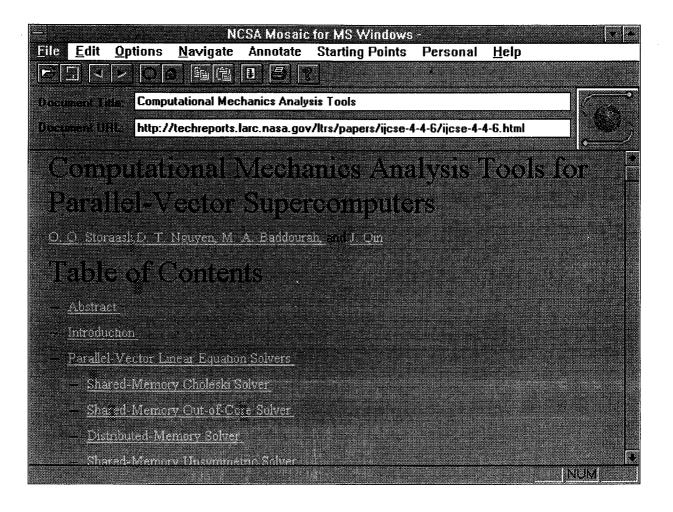
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Surrash, Olaf O., Nguyen, Duc. T., Baddourah, Majo, A. and Qu, Janguag. Computational Mechanics Analysis Tools for Parallel-Vector Supercomputers,"	
International Journal of Computing Systems in Engineering, vol. 4, no. 4, 6, Dec. 179	3.00
1-10, also in Parallel Computational Methods for Large-Scale Structural Analysis and De	
(Proceedings of NASA-sponsored Symposium held at the Merriott Waterside, Norfolk, V	
February 24-25, 1993 in cooperation with NASA Lewis Research Center, Intel Supercon	puters
Systems, Old Dominion University, University of Virginia and Cray Research Inc.).	
Keywords: structural analysis, supercomputers, design, analysis, high-performance comp	
HPCCP, equation solution, matrix equations, eigenvalues, opposization, domain decomposi-	aon,
assembly, nonlinear, parallel computers, sensitivity analysis, dynamics, massively parallel	
processing, MPP, scalable high-performance computers, computers, algorithms, structural mechanics, mechanics	
Abstract: Computational algorithms for structural analysis on parallel vector supernompu are reviewed. These parallel algorithms, developed by the authors, are for the assembly of	
structural equations, "out-of-core" strategies for linear equation solution, massively	
distributed-memory equation solution, unsymmetric equation solution, general enser solution	a
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STEP 29 Click once on the title highlighted in blue, and the title/author header as well as the table of contents will display.

Notice towards the top portion of the screen the **Document URL** appears as follows:

http://techreports.larc.nasa.gov/ltrs/papers/ijce-4-4-6/ijcse-4-4-6.**html** 

The **html** designation in the path signals this is a hypertext document which can be viewed online.



To move directly to the Introduction without having to scroll or page down, click once on **INTRODUCTION**.

To move directly to reference 1, click once on the number 1 highlighted in blue.

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Introduction	-
The analysis and design of complex aerospace structures requires the rapid solution of large	
systems of linear and nonlinear equations, eigenvalue extraction for buckling, vibration and flutt	
* modes, structural optimization and design sensitivity calculation. Computers with multiple proce	25022
and vector capabilities can offer substantial computational advantages over traditional scalar - computers for these analyses [1] Rapid progress has taken place developing parallel-vector	
computers although software to exploit their parallel and vector capability is still in its infancy.	
These computers fail into two categories, namely, shared-memory computers (e.g., Convex C-	240
Cray C-90) and distributed-memory computers (e.g., IBM SP-1 and SP-2, Intel Paragon, Think	
Machines CM-5).	
Shared-memory computers typically have only a few processors (i.e., up to 16 processors on a Cray C-90), which can address a large memory and candly process vector instructions (so add	
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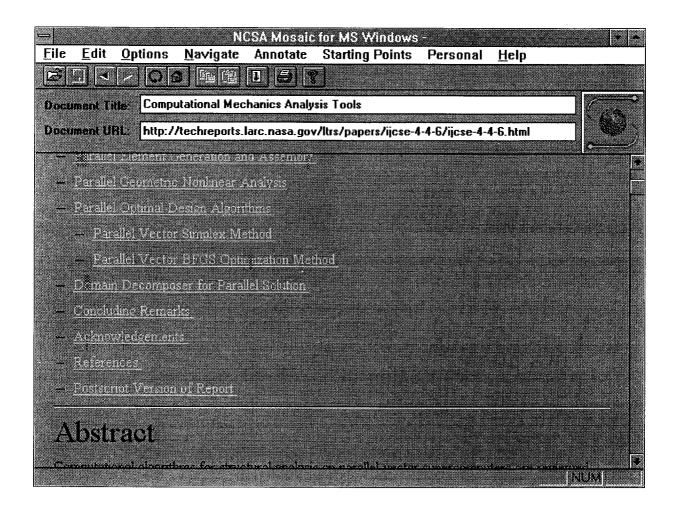
Distributed-memory computers are very different from their shared-memory counterparts and mos algorithms need to be rewritten to run efficiently on them. Distributed memory computers may hav STEP 31 To see Reference 1 which is highlighted in blue, click once on the number **1**.

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1. Storaasli, O. O., Nguyen, D. T. and Agarwal, T. K., "A Parallel-Vector Algorithm For Rapid. Strightral Analysis on High-Performance Computings" NASA TIA 102614, April 1990.
2. Agarwal, T., Storaash, O., and Nguyen, D., "A Parallel-Vector Algorithm for Rapid Structural Analysis on High-Performance Computers", ALAA Paper No. 90-1149, <i>Proc. of the ALAA/ASME/</i> ASCE/AHS 31st Structures, Structural Dynamics and Materials Conference, Long Beach, CA, April 2-4, 1990, pp. 662-672.
3. Qin, J., Agarwal, T. K., Storaasli, O. O., Nguyen, D. T. and Baddourah, M. A., "Parallel-Vector Out-of-Core Solver for Computational Mechanics", Proc. of the 2nd Symposium on Parallel Computational Methods or Large-Scale Structural Analysis and Design, Norfolk, VA, February 24-25, 1993.
4. Baddourah, M. A., Storaash, O. O. and Bostic, S., Linear State, Structural and Whitation Analysis on High-Performance Computational Methods for Large-Scale Structural Analysis and Design, Norfolk, VA, February 24-25, 1993.
5 Storaash, O. O., Nguyen, D. T. and Agarwal, T. K. "The Parallel Solution of Large-Scale Structural Analysis Problems on Supercomputers", AIAA Journal, Vol. 28, No. 7, July 1990, pp. 1211-1216.
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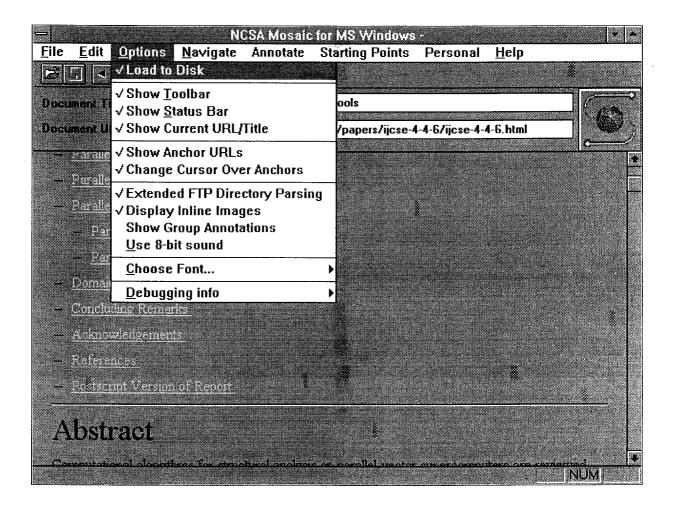
Because of limitations in HTML, there is no direct way to "click" back to the introduction. Using the scroll bar is often the easist way to navigate through the report.

STEP 32 To print a copy of this report, scroll back to the table of contents. The last item on the table of contents before the Abstract begins reads as follows:

### Postscript Version of Report



STEP 33 Point to the **OPTION** pull down window and click once. Next click once on **LOAD TO DISK** which is the first item on the OPTIONS menu.



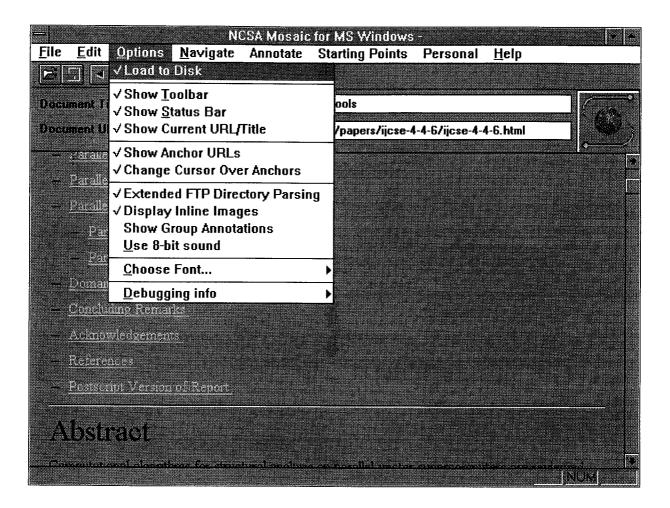
#### STEP 34

Now click once on **POSTSCRIPT VERSION OF REPORT**. The **SAVE AS** pull down window will display.

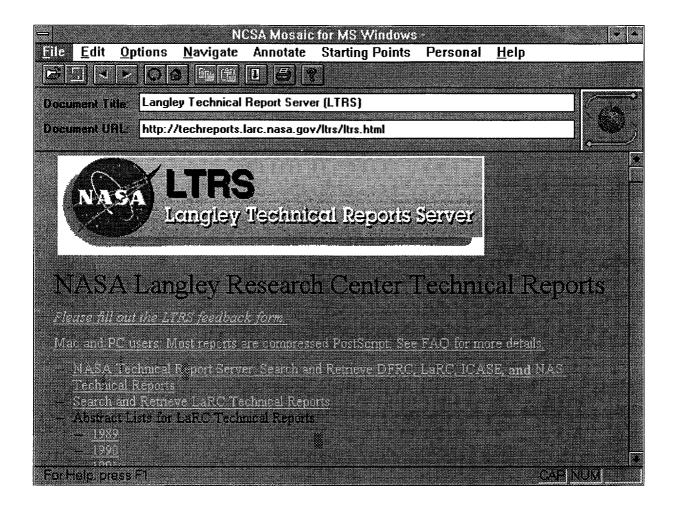
To complete the process to download and print this report, follow the same instructions which are included in STEPS 13-24.

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STEP 35 Return to Mosaic. Point at the **OPTIONS** pull down menu and click once. Next click once on **LOAD TO DISK** to remove the check mark from this option. If you do not disable Load to Disk, Mosaic will constantly prompt you for Save to Disk information.



STEP 36 Return to the original LTRS menu by clicking on the 'less than' symbol which is located on the top button bar, third from the left.



## TO BROWSE RATHER THAN SEARCH THE ABSTRACTS IN LTRS, PERFORM THE FOLLOWING STEPS

# STEP 37 Scroll down to see ABSTRACT LISTS FOR LARC TECHNICAL REPORTS. Click once on 1994.

To view, download and print, follow the same procedure as used before.

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6. AUTHOR(S) Donna G. Roper, Mary K. M Joanne L. Walsh, Michael L. Manjula Y. Ambur, and Brya	Nelson, Susan L. Adkins,			
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