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TECHNICAL NOTE

WWW-Based Teleconference System for the Study of Joining Science[†]

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KEY WORDS : (Teleconference System) (Internet) (Joining Science)

1. Introduction

Many researchers and engineers concerned with joining science have been spending much time participating in academic conferences, reading papers at these conferences, and debating result for many years. In order to obtain the best benefit from the discussions in these conferences, we think that active discussion by many participants is necessary and that, more people participate in these conferences. However, it may be difficult to hold meetings with many participants because of limitations of space, and it is difficult for many to take part in such meetings, especially the international ones, because of limitations of time.

In recent years, tens of thousands of researchers and engineers have been using the Internet to collect, send, and exchange information related to joining science. Nowadays, we search for papers and data by using World Wide Web (WWW) Browsers, and we show results of our research by web pages on WWW Servers. Moreover, we exchange opinions and we discuss issues by using Usenet, electronic mail (EMail), and WWW-based communications such as electronic bulletin board systems.

We have thought that if a "Virtual International Symposium" could be held on the Internet by using of these modern communicating tools, many more researchers will have a good opportunity to join the discussion and gain benefits. So we have investigated the requirement of a teleconference system that allows many researchers to participate without restriction of time and distance, and we have developed a teleconference system on the Internet. Furthermore, we have examined the form of an international symposium using this system.

2. Considering the Requirements of World Wide Teleconference Systems

We will begin by considering what an ideal conference is from the point of view of a participant. Firstly, many people can participate in this conference whenever they wish to. Secondly, they can keep up with a topic for discussion even if they leave the discussion. Thirdly, they can put unlimited numbers of questions or comments to each other.

As one means of actualizing such an ideal conference, we have considered the teleconference system using communicating tools on the Internet. This system allows many people to participate easily, users are not constrained by realtime connections, contents of the discussion are recorded, and anyone who connects with the system is able to read the record of discussions.

Table 1 shows typical communicating tools used widely on the Internet with their characteristics. In the needs mentioned above, first one indicates that this teleconference system requires nonexclusive software and widely used software, and many connections. The second indicates that the system does not require the realtime connection. In the four types of communicating tool in Table 1, "mailing lists" is only suitable for all the requirements mentioned above. However, it is not easy to keep up with one specific subject because many subjects are sent every moment to the mailing lists. On the other hand, it is easy to keep up with a specific subject in the electronic bulletin board because subjects are classified by topic in the bulletin board, but it must be examined regularly. From the above, we might conclude that a communicating tool combining the mailing list and the electronic bulletin board will be the most suitable for the teleconference system.

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Table 1 Communicating tools of teleconference on the Internet

| Communicating tools | | Software needs | Maximum connection | Realtime connection | Recording |
|---------------------|---------------------------|--------------------|--------------------|---------------------|----------------|
| EMail-based | Mailing lists | Mailer | Many | No need | Users & Server |
| WWW-based | Electronic bulletin board | WWW Browser | Many | As the case | Server |
| | Chat | WWW Browser | Many | As the case | Server |
| Voice-based | Voice-conferencing | Exclusive software | Few | Need | None |
| Video-based | Video-conferencing | Exclusive software | Few | Need | None |

3. Structure and Characteristics of WWW-based Teleconference System

Figure 1 shows the outline of a developed teleconference system. As mentioned in the previous section, this system is based on the Mailing lists and the WWW-based communicating tools. Therefore, this system requires that the client's computer has a WWW browser with a plug-in facility for reading papers as well as a mailer (EMail software). The Internet connects a client's computers and a Server, and data about requests and results, which are HTML (Hypertext Markup Language), PDF (Portable Document Format), or text, are transmitted through this connection. A discussion system that consists of papers database and council room runs the Server.

The detailed structure of the teleconference system is shown in Fig. 2. The whole of the discussion system is written in Perl 5 scripts because of the portability of this system. The "papers database" has information on papers,

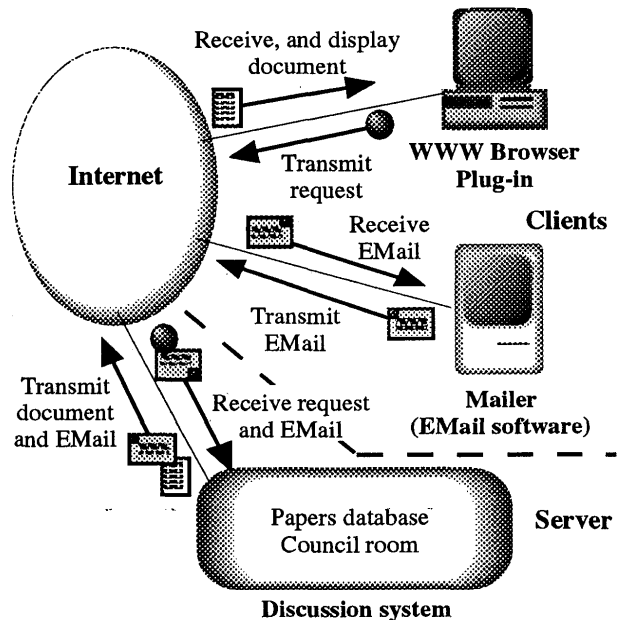


Fig.1 Outline of teleconference system

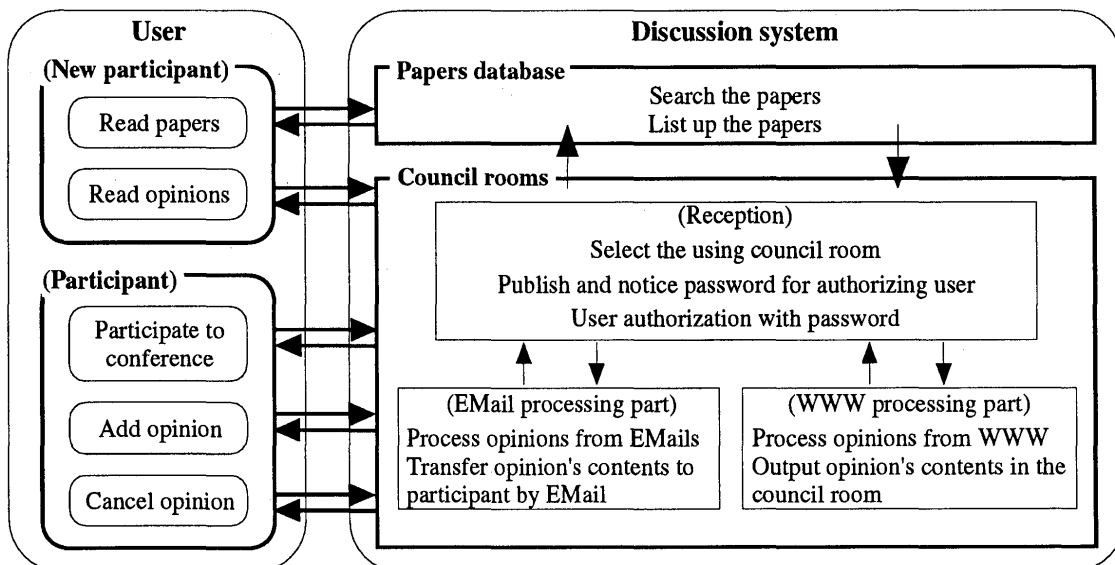


Fig.2 Structure of teleconference system

title and author's name, and stores whole texts of papers as PDF files. "Council rooms", which consist of "reception", "EMail processing" part, and "WWW processing" part, process the request from the WWW browser and the opinions from a mailer. Moreover, it sends result and EMail to the client. These are different from ordinary mailing lists and electronic bulletin boards. With such a structure, the system has advantages over ordinary communicating tools in the followings ways: new participants are able to ascertain the content of discussion easily; participants are able to read the contents by WWW browser in realtime, or by EMail when they feel like it.

4. Application of the Teleconference System

As an application of the proposed teleconference system, we have opened an international symposium named 'JWRI Online Symposium'. Clients' and servers' environments are shown in Fig. 3, and the developing environment is shown in the same figure. Figure 4 shows the top page of 'JWRI Online Symposium'.

Figure 5 shows the structure of the 'JWRI Online Symposium' with a stream of a adding opinions by new participant. A paper that we would like to read will be located by its title and author's name as shown in Fig. 6. The result is shown in a paper's list. It has links to articles of each paper and council room for each paper as in Fig. 7. We will watch

Clients' environment

| | |
|------------------------|---|
| WWW browser | HTML 3.0 or later compatible e.g. Netscape Navigator, Internet Explorer |
| PDF document viewer | Adobe Acrobat plug-in or Acrobat reader |
| E-mail client software | Supports SMTP,POP3 e.g. Eudora, Claris E-Mailer |

Servers' environment

| | |
|-------------|---|
| Web server | Power Macintosh 8500/120 2.0GB HDD/48MB RAM KanjiTalk 7.5.2 Open Transport 1.1.2, WebSTAR 1.3.2 |
| Mail server | SunOS Release 4.1.3- JLE1.1.3(UNIX) SMTP daemon,POP3 daemon |

Developing environment

| |
|---|
| MacPerl version 5.1.3r2 (Perl 5 compatible) |
|---|

Fig.3 Environments of JWRI online symposium

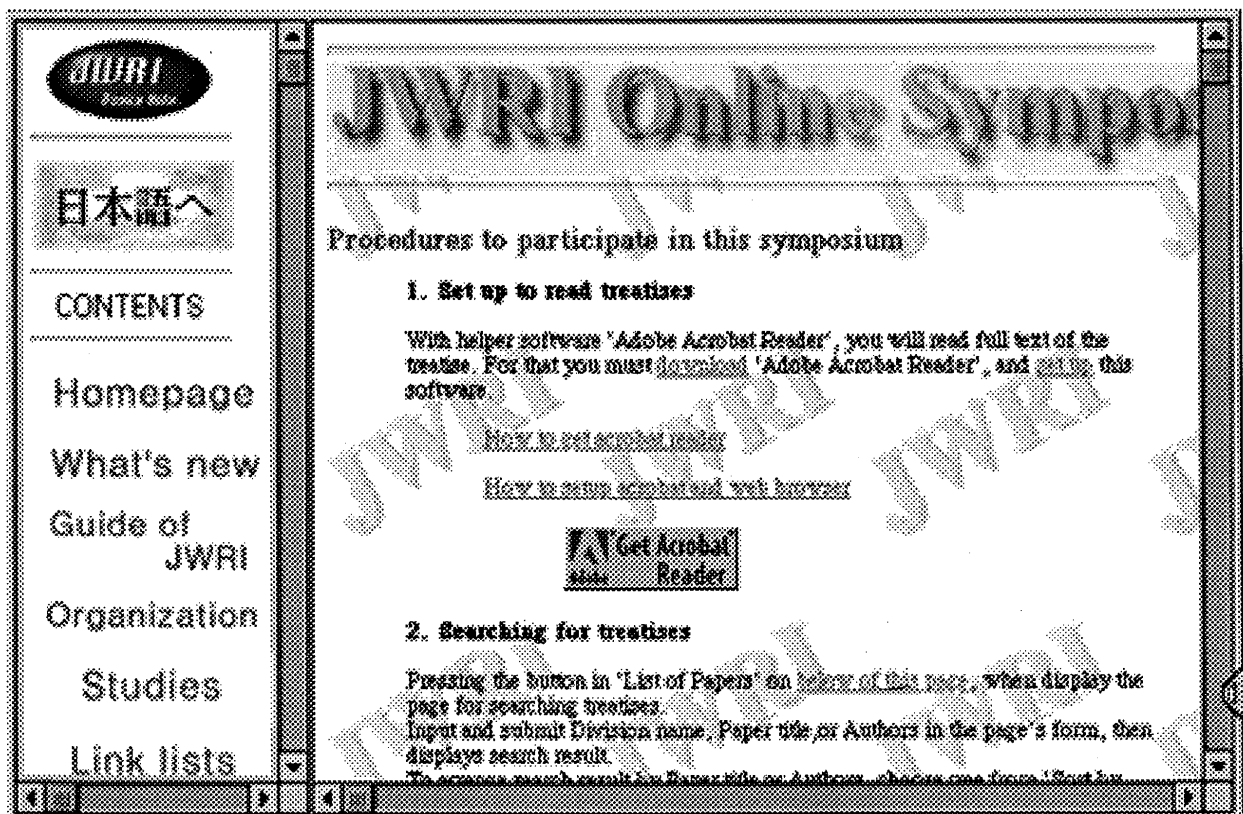


Fig.4 Top page of JWRI online symposium

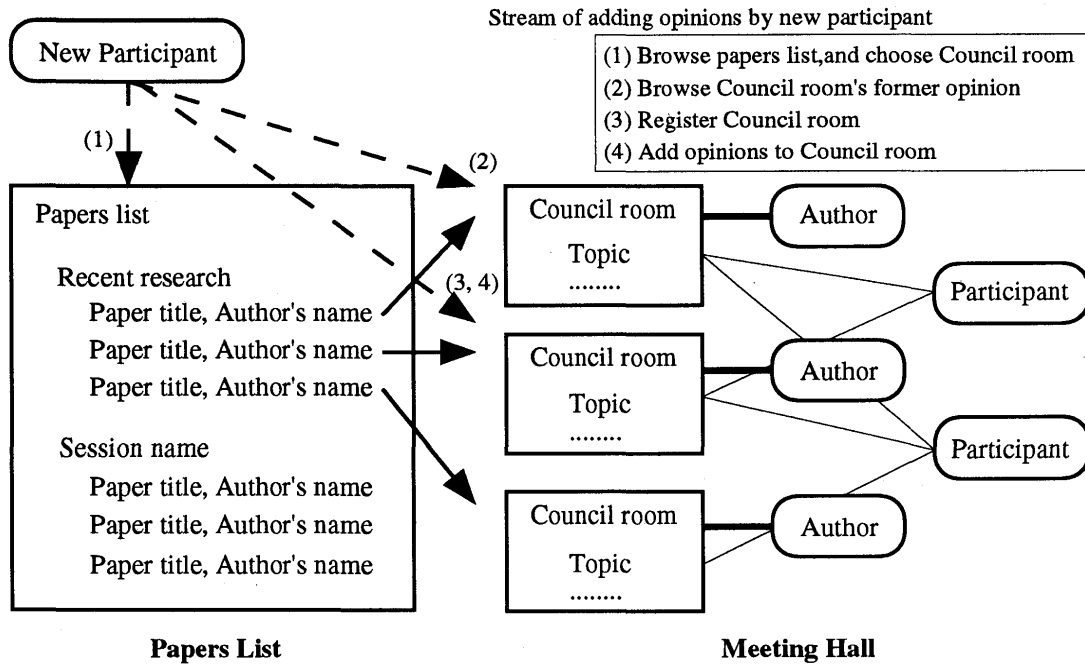


Fig.5 Structure of JWRI online symposium

the article by using a PDF viewer with this link. Figure 8 shows a sample of the article. We will also watch the topic of council room by these links as in Fig. 9. If we would like to add opinion, we should register name and EMail address

with this system, and then add opinions on the page like as Fig. 10 or add opinion by EMail. Added opinion is shown in this page and sent to other participants that have already registered with this system.

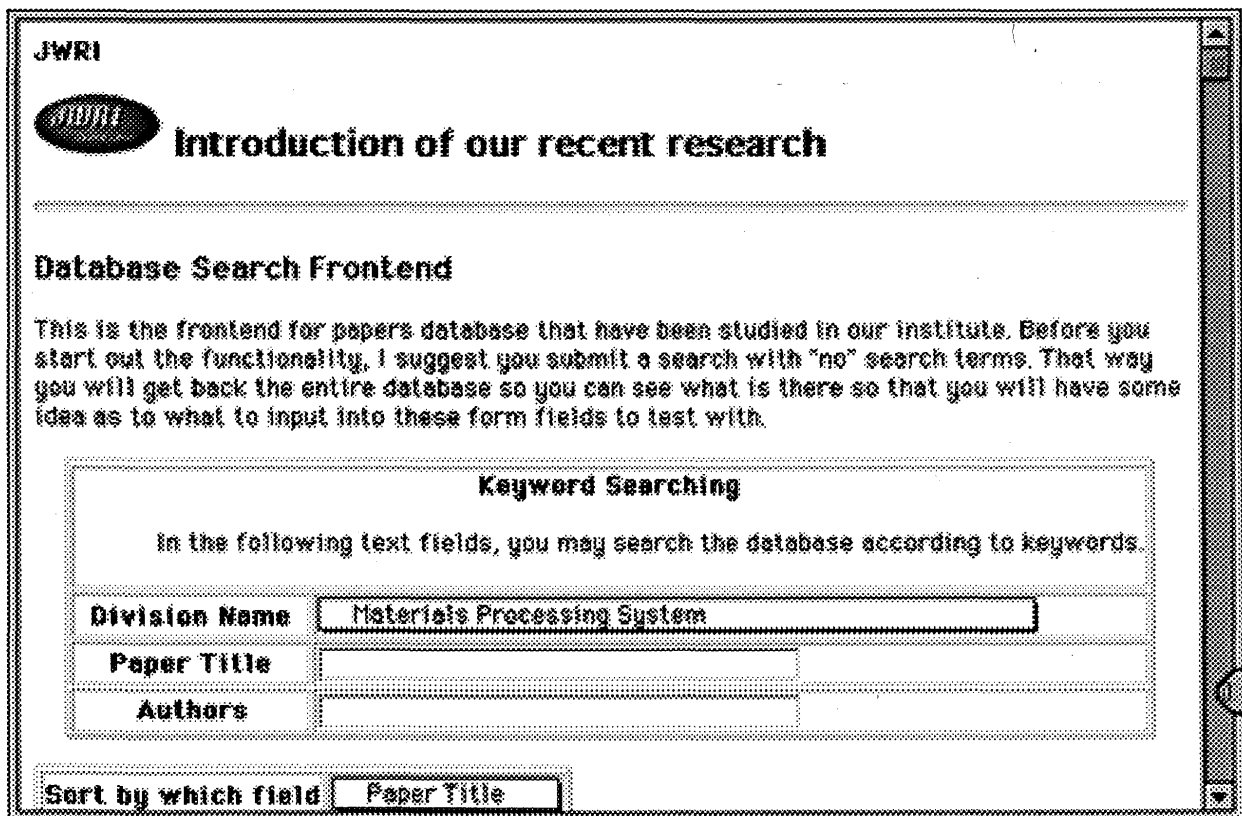


Fig.6 Search page of papers database

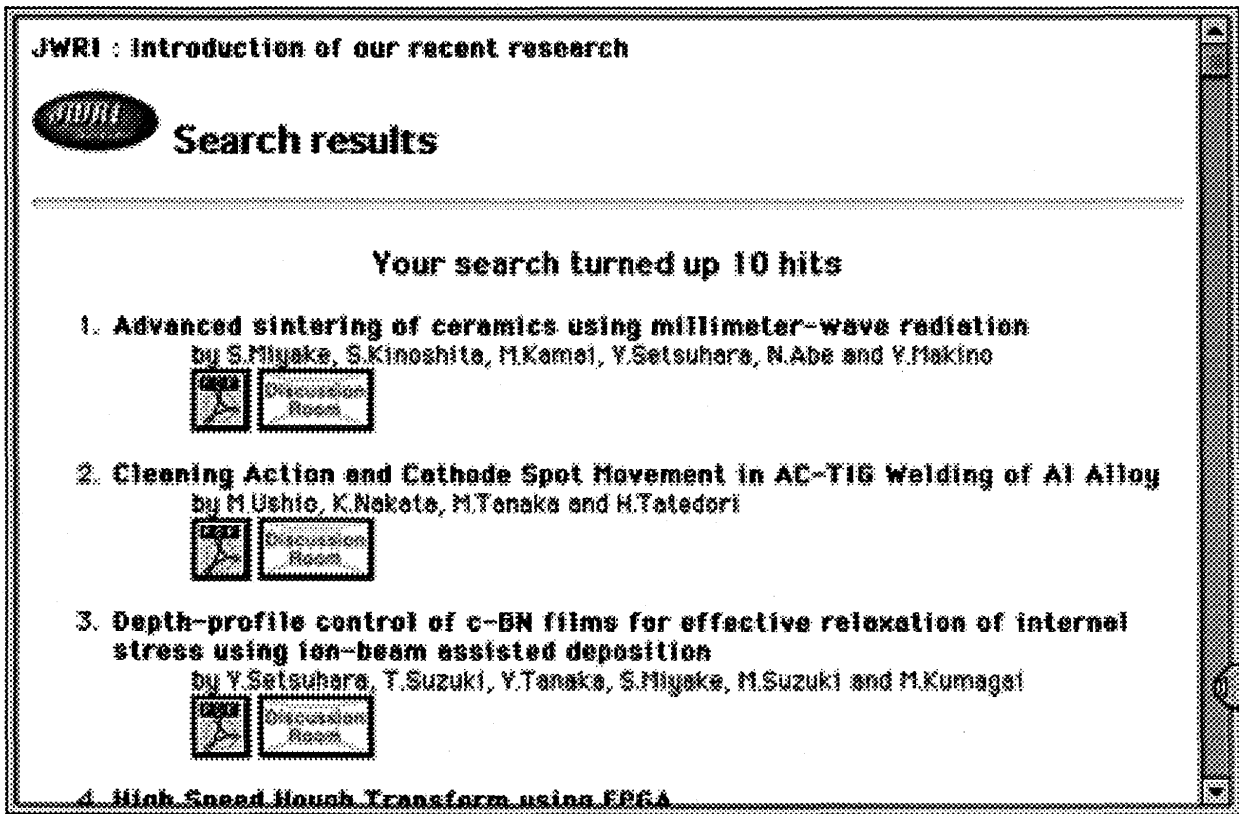


Fig.7 Sample of searched results is shown in a papers list

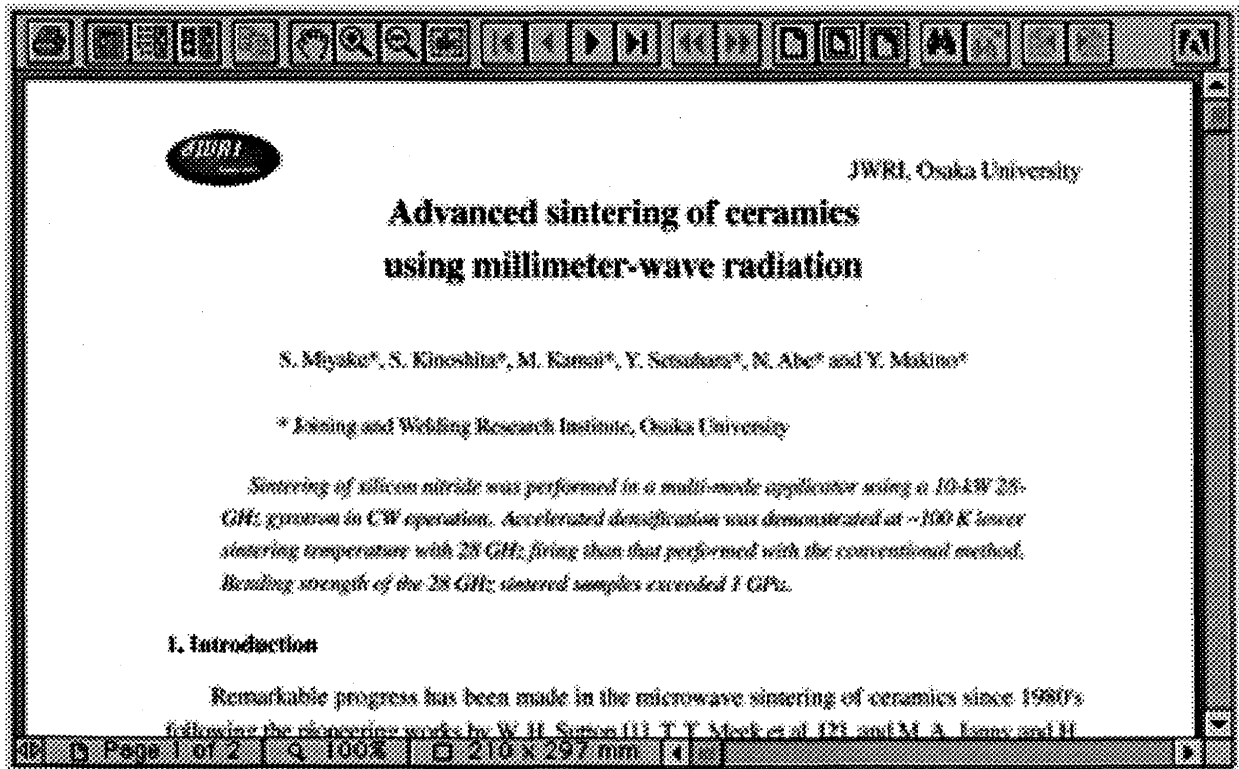


Fig.8 Sample of an article of PDF format

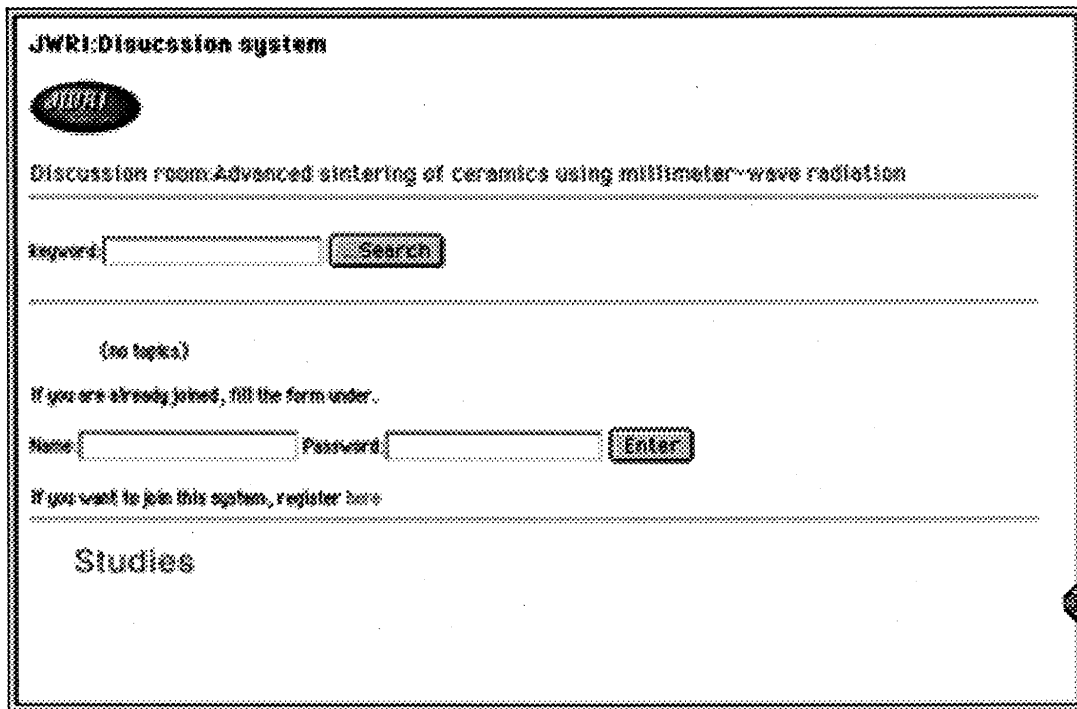


Fig.9 Sample of a council room for new participant

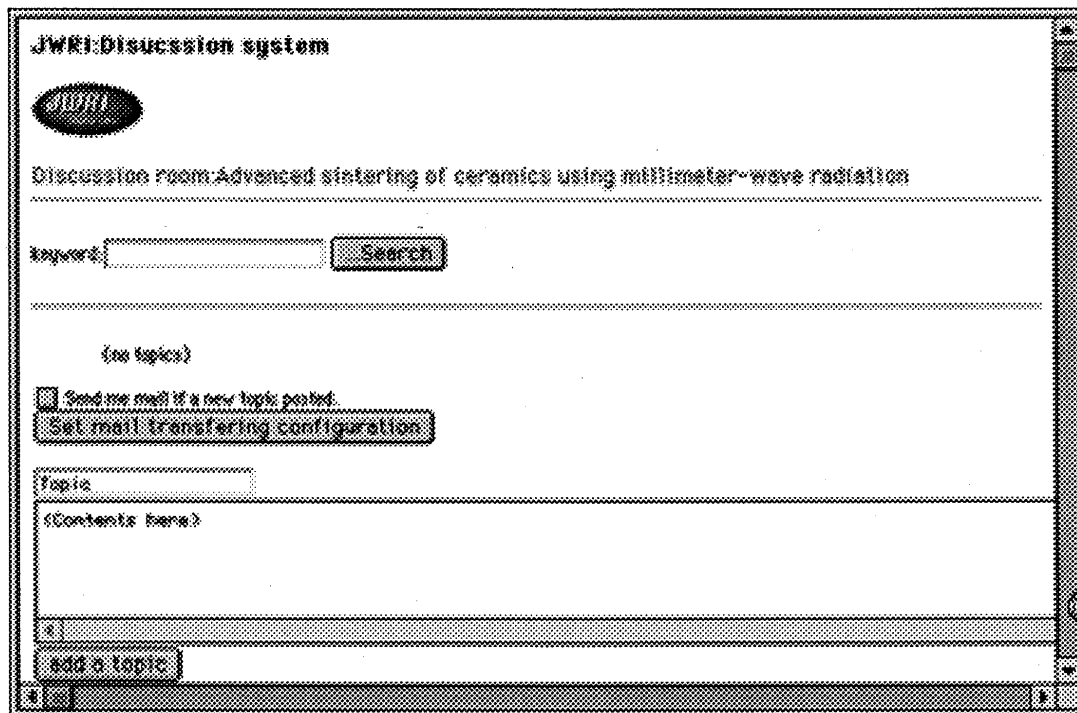


Fig.10 Sample of a council room for registered participant

5. Conclusions

We have investigated the requirements of a teleconference system, and developed a teleconference system using the Internet. Moreover, we have opened the 'JWRI Online Symposium' by using this system. It will be identified by

the following URL: 'http://www.jwri.osaka-u.ac.jp/Study/index-e.html'. We hope that many people will participate in this symposium and take the opportunity to discuss and exchange opinions and data. We also hope that this system will contribute something to the growth of joining science.