第10回IAEA核データセンター会議とNRDFの寄与

北海道大学大型計算機センター　千葉　正喜

1．はじめに

IAEA 10th Consultants' Meeting of the Nuclear Reaction Data Centersが 1989年10月2～4日にウイーンのIAEA本部で行われた。IAEAから外務省を経由した参加要請があったので参加することにしたのであるが、IAEAが主催するこの種の会議に参加する初めてである。私がここIAEA本部を訪れるのは二度目で、NRDFのデータをEXFORに翻訳変換するNTXシステムの開発の過程の1983年8月に、このNTXを使って作成した変換結果についてNDSのスタッフと討議して以来のことになる。

この会議の内容はいずれ INDCレポートとして公表されるが、ここでは、NRDFの活動に関係すると思われる部分を非公式に述べることにする。

2．NRDFの寄与

この会議では主にCINDAおよびEXFORに関する規則、および Photonuclear dataとCPNDに関する協力等について協議された。この会議にはIAEAのNDSの他に、NNDC,NEA-DB,CJD,CAJAD,RIKEN,CDFE,IEA-CPからそれぞれ代表が参加していた。この会議に対して各データセンターは、それぞれその活動を報告することになっているが、NRDFの活動状況は付録１のように報告した。

この会議でEXFORに関して新しいキーワードLEVEL-PROPが採択された。これが導入された背景には、NRDFから変換してテスト的に送ったデータのなかに従来のEXFORのデータタイプには収まらないものであったためである。これは、NRDFのEXFOへの貢献と考えてよいものであろう。

NRDFからEXFORに変換したデータはTRANSテープに編集してNDSに送るが、これまでE001,E002,E003,E004,E005,E006を送っている。このうち、E005とE006は89年に送ったもので、それぞれ10エントリーと7エントリーが含まれている。TRANSテープE004はそのエントリーがNDSのマスターファイルに登録された最初のTRANSとなった。89年11月14日付けでNDSから送られてきたTRANSテープには、このNRDFから変換して作成したデータが含まれていた。E006にはLEVEL-PROPキーワードのドラフトに基づき変換したエントリーが含まれている。これは確定した規則により再変換して送り直す必要がある。

NRDFからEXFORへの変換は、このように実績を重ねて、軌道に載ってきたものと考えられる。NRDFの活動は現在「EXFOR　SYSTEMS MANUAL」に"SG"(Study Groupe)として登録されているが、NDSの担当者からも現在の状態に相応しい適当な名称にしてはどうかとの非公式の示唆を受けた。

CAJADのChukureevからはNRDFに収集している全データのインデックスを請求されている。

3．まとめ

以上、この会議でNRDFに関して話題になった点をその背景を含めて述べてきた。

NRDFのEXFORに対する寄与はまだ決して大きくはないが、それでもこの国際的なデータ活動に参加することで、IAEAのNDSからはそこに集積されたEXFORフォーマットの荷電粒子核反応データのコピーが送られてきている。ま

た、11月に行われた日本原子力研究所が主催する「1989年核データ研究会」ではNRDFとその国際データ交換の活動を報告する機会が与えられ、「荷電粒子核反応データベースの作成と国際データ交換活動」と題して講演した。この研究会の報文集には付録２の報告が掲載されることになるだろう。この研究会でも、荷電粒子核反応データに対する関心が高まりつつあることが示された。NRDFに収集しているデータに対する関心が今後さらに強まることが予想される。そして、NRDFデータに加えて、NDS等から送られてくるEXFORデータも日本国内の研究者が有効に利用できるように「NRDF-EXFORシステム」として整備することが今後の課題として重要であろう。

Report to the 10th NRDC Meeting on NRDF activity and its data conversion into EXFOR

M. Chiba
(Hokkaido Univ. Computing Center, Sapporo Japan)

1. Brief outline of NRDF history

A research project of data compilation of charged particle nuclear data began in 1974. This research project was conducted by Professor H. Tanaka of Hokkaido University. The members of the project comprised several researchers in the field of experimental and theoretical nuclear physics. The project itself and these members were reported to the experimental and theoretical nuclear research communities in Japan and approved.

This research project has bred a data storage and retrieval system for charged particle nuclear reaction data, which is called NRDF. NRDF is abbreviation of "Nuclear Reaction Data File".

Data compilation with the NRDF has been continued for the past 10 years. At the end of March 1989, total amount of compiled data is about 46 MB record. 691 entries are stored on the NRDF and available for retrieval.

This research project had been supported temporarily until 1986 with various research grants of the Japanese Ministry of Education, Research and Culture. The NRDF project was approved as permanent work in 1987. From this year, the NRDF project has been give regular financial support by that Ministry. So the project is now in more stable state in respect to data compiling activity.

2. EXFOR translation

The NRDF was originally designed mainly to satisfy regional needs and interests of nuclear physics research communities in Japan. It has its own data compiling format and structure. To raise some feature, it has flexible data compiling structure in order to include newly comming data types and to have sufficient information to understand the data.

Therefore the NRDF as it is could neither circulate itself nor contribute in compiling nuclear reaction data internationally. Nevertheless it may be clear that NRDF should share some responsibility in world-wide data compiling of CPND.

The way we adopeted to meet these demands is to translate data of NRDF format into that of EXFOR format. We have decided to develop the database translator. It is named NTX, which is abbreviation made up from "NEDF To EXFOR". The first version of NTX was completed in 1982. Then TRANS E001 was submitted. In 1983, TRANS E002 was submitted and I (Chiba) visited IAEA and discussed with Dr. Lemmel about the result of the translation. He carefully checked the data and gave me useful comments and advice. It was found that the NTX should be revised to eliminate the defficiency. So improving the NTX was started. The second version of NTX was completed in 1988. The main points of improvement are to utilize the DBMS in storing and retrieving NRDF data and dictionaries, and to incorpolate some EXFOR programs delivered to handle translated EXFOR entries. TRANS E003 and E004 were submitted in 1988. Entries in E004 are all revised ones of E003. E004 is the first TRANS accepted into EXFOR Master File.

3. Computer Facility

The Computer facility we use in data compiling and data translation is Hokkaido University Computing Center. This Center has a HITAC M682 computer and HITAC S820 vector computer.

The data storage and retrieval system of NRDF is installed on M682 Computer system of Hokkaido University Computing Center. The computer system is also linked to "National Scientific Information Network". This network connects all the national academic service computer cetners including "National Center for Science Information System" and several computers of each universities. Every researchers in universities or colleges in Japan may retrieve the NRDF through the network or terminals directly connected.

The retrieval system of the NRDF is also installed on the Center for Information Processing Education Hokkaido Univ., the Institute for Nuclear Study Tokyo Univ. and the Research Center for Nuclear Physics Osaka Univ.

4. NRDF Organization

The NRDF project was accepted as a permanent work in 1987 as mentioned above. With this as a turning point, the organization of the NRDF project has been renewed. Current NRDF project comprises two committees and working staff.

(1) NRDF Advisory Committee

Various problems concerning the project such as a policy of data compiling are inquired to this committee for deliberation. The members are assigned to researchers of related fields in various institutes in order to get nation-wide coordination.

The committee members are as follows.

Yasuhisa ABE (Research Institute for Fundamental Physics, Kyoto Univ.)
Hidetugu IKEGAMI (Research Center for Nuclear Nuclear Physics, Osaka Univ.)
Hajime OHNUMA (Tokyo Institute of Technology)
Hikonojo ORIHARA (Cyclotron and Rdioisotope Center, Tohoku Univ.)
Mitsuji KAWAI (Kyushu Univ.)
Teijiro SAITO (Tohoku Univ.)
Fumihiko SAKATA (Institute for Nuclear Study, Tokyo Univ.)
Naomoto SHIKAZONO (Japan Atomic Energy Research Institute)
Kozi NAKAI (National Institute for High Energy Physics)
Akira HASHIZUME (Institute of Physical and Chemical Research)
Hiroshi YOSHIDA(Tokyo Institute of Technology)

(2) NRDF Executive Committee

The NRDF executive committee is responsible for the project.

Hajime TANAKA (Representative of NRDF, Sapporo-Gakuin Univ.)
Yoshinori AKAISHI(Executive Chairman, Hokkaido Univ.)
Shigeto OKABE (Hokkaido Univ.)
Toshiyuki KATAYAMA (Hokusei Univ.)
Kiyoshi KATO (Hokkaido Univ.)
Masaki CHIBA (Hokkaido Univ.)

Hiroyasu NAGATA (Hokkaido Univ.)
Hiroshi NOTO (Hokusei Univ.)

(3) Working staff

Data compilation
Yoichi TEZUKA (Institute for Nuclear Study, Tokyo Univ.)
Tamaki NOJIRI (Research Center for Nuclear Physics, Osaka Univ.)

Computer input
Hitomi YOSHIDA

NRDF system maintenance
Toru HARADA (Hokkaido Univ.)

5. Current policy

The data compiled for the past year were proton incident nuclear reaction data in Nuclear Dtata Sheets from Vol. 29(1979) to Vol. 45(1985) and a part of charged particle nuclear data produced in Japan.

In the new stage of our activity, we have reconfirmed the following policy.

(1) The amount of data to be compiled per year would be about 3. 5 MB.
(2) The scope of data to be compiled is to be proton incident nuclear reaction data and charged particle nuclear reaction data produced in Japan.
(3) Distribution of NRDF data is supposed to be delivered through the National Center for Science Information System in the future. And also NRDF data with retrieval system is to be delivered and updated to the Institute for Nuclear Study, Tokyo Univ. and the Research Center for Nuclear Physics, Osaka Univ.
(4) The charged particle data produced in Japan are to be translated into EXFOR.
(5) The NRDF activities are to be reported with "NRDF Annual Report".

The NRDF project is now running under this policy.

We have been recognizing that it would be necessary for a database covering a certain field of science in a world-wide context to coordinate efforts and to cooperate with every countries. We would like to respect the NDS and other participating centers for the efforts of nuclear data compiling and to express our thanks to those centers for coordination and cooperation up to this day.

We would like to express our intention to submit our data to CPND in EXFOR format by converting from NRDF and to contribute some part to international nuclear data activity.

Compilation of Charged Particle Nuclear Reaction Database and Database Conversion for International Coordination

Masaki CHIBA
Hokkaido University Computing Center
Kita-11 Nishi-5, Kita-ku, 060
Sapporo JAPAN

Abstract:

Practice for the past more than fifteen years of NRDF activity in compilation and international exchange of charged particle nuclear reaction data and their current status is reported. The way of the practice comprises major two parts: the one is to have its own data compiling format and data storage and retrieval system named NRDF for the need of regional users; the other is to have database translator from NRDF into EXFOR for the international data exchange. The attainment of NRDF is discussed against the conditions issued for a database used from outside.

1. Introduction

It is essential for constructing a database of charged particle nuclear reaction data (CPND) to get cooperation and support from researchers in the field of this country. We could see many cases that a database would become effective when a certain amount or more data had been accumulated. Data compilation of a database is also an elaborate and manpower consumming task. Especially in a scientific database, it requires some general and specific knowledge in the field. It is also necessary to fully utilize the advanced environment of computer facilities of this country. For these reasons, a new data compiling format and its data storage and retrieval system called NRDF(Nuclear Reaction Data File) is originally devised for CPND[1].

The other hand, if we wish a certain database to cover a given field in the world-wide extent, it is desirable for all the countries having activities in the field to share some efforts of compiling the data, at least produced from their own countries, and to exchange the data among these countries. In such a case, the participating countries must obey the agreed common data compiling scheme. Actually, there is an international data exchange format for nuclear reaction data called EXFOR[2]. NRDF data has a different scheme from EXFOR. Therefore NRDF as it is cannot have compatibility with EXFOR.

We must override these conflictions between the common format (i. e. EXFOR) and the way of having their own one (i. e. NRDF). The way we have adopted for the international coordination is to translate the data in NRDF into those of EXFOR[3].

We have been continuing the research and development of CPND database compiling with the original NRDF system for the past fifteen years[5, 6]. And also by having developed the database translator from NRDF to EXFOR, we have been participating internationally in the field. Followings will be reported of these practices. Finally the attainment of NRDF will be summarized with respect to the conditions issued for a database used from outside[7].

2. Outline of NRDF

A research project of data compilation of charged particle nuclear reactions began in 1974 with approval of the experimental and the theoretical nuclear research communities in Japan. This research project was conducted by Professor H. Tanaka of Hokkaido University. The members of the project comprised several researchers in the fields of experimental and theoretical nuclear physics, and of information science. The project has bred a data storage and retrieval system called NRDF for charged particle nuclear reaction data. This system has several distinctive features such as free format description, set-structures of information blocks and data lunguage, and so on[1].

Data compilation with NRDF has been continued for the past 10 years. At the end of March 1989, total amount of compiled data is about 46 MB record, and 691 entries are stored on the NRDF system and they are available for retrieval.

This research project had been supported temporarily until 1986 with various research grants of the Ministry of Education, Research and Culture. The project was approved as a standing work in 1987. From this year, it has been given regular financial support. The project is now in more stable state in respect to data compiling activity.

3. Translation of NRDF into EXFOR

NRDF was originally designed mainly to satisfy regional needs and interests of nuclear physics research communities in this country. It has its own data compiling format and structure in order to include newly coming data types and to have sufficient information to understand the data compiled. Therefore NRDF as it is could neither circulate itself nor contribute in compiling nuclear reaction data internationally. Nevertheless it may be clear that NRDF should share some responsibility in world-wide data compiling of CPND. The way we adopted to meet these demands is to translate the data of NRDF format into those of EXFOR format. We have developed a database translator called NTX, which is made up from "NRDF To EXFOR".

The first version of NTX was completed in 1982 and TRANS E001 was submitted. In 1983, TRANS E002 was submitted and the author visited IAEA and discussed about the result of the translation. It was found that the NTX should be revised to eliminate the defficiency.

The second version of NTX was completed in 1988. The main points of improvement are to utilize DBMS in storing and in retrieving NRDF data and dictionaries, and to incorporate some EXFOR programs delivered from NDS of IAEA to handle the translated EXFOR entries.

TRANS E003 and E004 were submitted in 1988. Entries in E004 are all revised ones of E003. E004 is the first TRANS accepted into EXFOR Master File. In 1989, TRANS E005 and TRANS E006 were submitted and the author attended the 10th IAEA Consultants' Meeting of the Nuclear Reaction Data Centers held at IAEA headquarters in Vienna.

NRDF is located at one of the centers and groupes which have been represented at meetings and have expressed interest in cooperation, and is now entered as SG(Study Group) in the EXFOR Systems Manual[6]. SG might be changed by a name more appropriate reflecting the current NRDF status in the EXFOR system.

4. Computer facility and NRDF distribution

The data storage and retrieval system of NRDF and the NTX database translation system are installed on the HITAC M682 Computer system of Hokkaido University Computing Center. The M682 system is also connected to the National Science Information Network, so every researchers in the universities or colleges of the country can reach to NRDF through the Network.

The retrieval system of NRDF is also installed on the Center for Information Processing Education, Hokkaido University, the Institute for Nuclear Study, Tokyo University and the Research Center for Nuclear Physics, Osaka University.

5. Current NRDF organization and policy

5.1 Organization

With the change of the project status in 1987 as a turning point, the organization of NRDF project has been renewed. Current NRDF project comprises two committees and working staff.

(1) Advisory Committee

Various problems concerning the project such as policy of data

compiling are inquired to the Advisory Committee for deliberation. This committee comprises 11 members of 10 different institutes. These members are assigned to the researchers of related fields of various institutes in order to get nation-wide cooperation and supports.

The committee members are as follows.

Yasuhisa ABE (Research Institute for Fundamental Physics, Kyoto Univ.)
Hidetugu IKEGAMI (Research Center for Nuclear Physics, Osaka Univ.)
Hajime OHNUMA (Tokyo Institute of Technology)
Hikonojo ORIHARA (Cyclotron and Radioisotope Center, Tohoku Univ.)
Mitsuji KAWAI (Kyushu Univ.)
Teijiro SAITO (Tohoku Univ.)
Fumihiko SAKATA (Institute for Nuclear Study, Tokyo Univ.)
Naomoto SHIKAZONO (Japan Atomic Energy Research Institute)
Kozi NAKAI (National Institute for High Energy Physics)
Akira HASHIZUME (Institute of Physical and Chemical Research)
Hiroshi YOSHIDA(Tokyo Institute of Technology)

(2) NRDF Executive Committee

The Executive Committee is responsible for the project. This committee comprises 8 members of 3 different institutes.

Hajime TANAKA (Representative of NRDF, Sapporo-Gakuin Univ.)
Yoshinori AKAISHI(Executive Chairman, Hokkaido Univ.)
Shigeto OKABE (Hokkaido Univ.)
Toshiyuki KATAYAMA (Hokusei Univ.)
Kiyoshi KATO (Hokkaido Univ.)
Masaki CHIBA (Hokkaido Univ.)
Hiroyasu NAGATA (Hokkaido Univ.)
Hiroshi NOTO (Hokusei Univ.)

(3) Working staff

For data compilation, computer input and system maintenance, the project now has a staff of 4 part-timers.

Data compilation
Yoichi TEZUKA (Institute for Nuclear Study, Tokyo Univ.)
Tamaki NOJIRI (Research Center for Nuclear Physics, Osaka Univ.)

Computer input
Hitomi YOSHIDA

NRDF system maintenance
Toru HARADA (Hokkaido Univ.)

5. 2 Policy for NRDF activity

The data compiled for the past years were proton incident nuclear reaction data in Nuclear Data Sheets from Vol. 29(1979) to Vol. 45(1985) and a part of charged particle nuclear data produced in Japan. In the new stage of our activity, we have reconfirmed the following policy.

(1) The amount of data to be compiled per year will be about 3. 5 MB.
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(4) The charged particle data produced in Japan are to be translated into EXFOR.

(5) The NRDF activities are to be reported with "NRDF Annual Report".

The NRDF project is now running under this policy.

6. Summary

NRDF is a database being compiled by the NRDF groupe; that is produced in the country not imported. There are four conditions raised in [7] for a database to be used from outside users, relating discussion of establishing the Database Center in JAERI.

We will conclude giving some summaries of our attainment against to these four items.

(1) Data completeness

If a certain research field is given, it may be seldom the research activities will be found at only one country of the world, especially in natural science. There would be many activities over many countries. Supposed to make a database covering over the given field completely, it seemes that international cooperation is essential. it is necessary for a certain country to share some responsibility in compiling the data, at least produced in the country. The data completeness might be achieved by exchanging the data compiled in such a way. This is the reason why we have been constructing NRDF of our own effort and translating the data in it into EXFOR.

(2) High-grade and user-friendly DBMS

The data storage and retrieval system of NRDF we are now using was wholly developed utilizing VSAM facility. At that time when the system was developed, there were not any ready-made commercial DBMS's available for numerical databases. The NRDF system was developed with its own original idea. It has newly devised storage structure for the numerical tables[1]. However the data retrieval feature is such one that a document retrieval system has. Namely as a document retrieval system selects fewer documents for specified selection criteria step by step, The NRDF system can do also for the numerical tables.

Nowadays total amount of data accumulated in NRDF would have reached upto 50MB, some more facilities, for example, by which we can see the whole database with several aspects are eagerly hoped to be installed. To realize these facilities that the current NRDF system does not have, it might be the best way to select a commercial DBMS of relational type and to develop revised NRDF system as an application of DBMS.

(3) User manual provision

User manual "GUIDE to NUCLEAR REACTION DATA FILE(NRDF)" has already been prepared in both Japanese and English[8]. They are stored in the computer file, so they can also be seen from computer terminals or put into print.

(4) Announcement of development status to users

As stated in the policy of NRDF, "NRDF ANNUAL REPORT" has been published every year since 1987, and distributed to the persons or the institutes of related fields and the authorities concerned.

Acknowledgement

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