

An Index Database of Charged-Particle Nuclear Reaction Data

Masaki CHIBA*

Faculty of Social Information, Sapporo Gakuin University

and

Kiyoshi KATŌ*

Department of Physics, Hokkaido University

Abstract:

We give a brief explanation of a retrieval system for the index information of Charged-Particle Nuclear Reaction Data, which has been installed in Hokkaido University Computing Center. For the installation of these data, the ORION Information Retrieval System has been used. The main purpose of the new system is to open a way for researchers to get benefits from utilizing the Charged-Particle Reaction Data in NRDF and EXFOR systems.

1. Introduction

We have made a database system of Charged-Particle Nuclear Reaction Data, which is called NRDF, and compiled many data so far. Those data have also been translated into the international data exchange format, called EXFOR. Therefore, we can now utilize the charge-particle nuclear reaction data in NRDF and EXFOR.

The retrieval system of NRDF data has been already available in several computer systems. However, we have no convenient systems for EXFOR data in Japan. In order to allow many researchers to use those data, we have tried to install them in the National Center for Science Information System (NACSIS). The contents of

*Japan Charged-Particle Nuclear Reaction Data group

NRDF and EXFOR databases consist of the data of index information and numerical results. However, in the present situation, it is not supported to install numerical data in NACSIS.

The present EXFOR data which we have received from IAEA reach to an amount 30 MB including about 1,500 entries. To take our responsibility for EXFOR data in Japan, we constructed a new database of index information of EXFOR data. This report is a brief explanation of the index information retrieval system.

By using this system, we can find the EXFOR entries or subentries of the desired data. This system has been constructed and available in Hokkaido University Computing Center. We have a plan to install the system in NACSIS-IR (Information Retrieval Service of the National Center for Science Information System).

2. Content of the Database

2.1 Record definitions

The content of the database consists of some index information of Charged-Particle Nuclear Reaction Data stored in the EXFOR Library. We utilized the programme XNISPR [1] to prepare index information records. Information items of the record are shown in Table-1, which are same as in of XNISPR. A program called "input processor" was developed in order to load the index data records to the ORION database management system. The input processor reads the data which are made by the XNISPIR and transforms them so as to match data definitions in ORION.

Table-1 shows all the basic field items of a index data record. Table-2 shows compound fields defined for a set of fields of Table-1. They can be used as a parameter of the ORION commands to receive the result of the search.

2.2 Indexings of a filed

Table-1 also shows the fields for which inverted indexes are made in the ORION Database Management System. Each no blank value of the "Index-Field & its Prefix" column in the Table-1 designates that inverted index is made for the field. Inverted indexing is made either for the whole value of the field or for the part of it. The latter is called partial indexing. For a given field, more than one inverted indexing may be made. This case is called multi indexing. Table-3 shows the fields

for which partial indexing or multi indexing are made.

3. Searching the Database

When searching the Index Database of Nuclear Reaction Data, we have to refer Tabel-1, Tabel-2 or Table-3, and consult the ORION online user guide[3]. In the following, we briefly explain how to search the Database. Fig.-1 shows an example of retrieval operation.

3.1 Beginning and ending online searching

To begin online searching of the Database, we have to key-in a starting command, "CPND" in HOkkaido University Computing Center. After keying "CPND" at TSS session, we can enter an ORION retrieval session. Then we can submit any ORION commands to search CPND entries or subentries compiled in EXFOR.

"QUIT" command terminates ORION session and returns to TSS session.

3.2 Index search facilities

Index search is performed by "FIND" command. The "FIND" command provides several search facilities using inverted indexes. We specify a search term or a combination of search terms with logical operators as an option of the command. If the command is performed, a set of records containing the term(s) is made and a set number is assigned to the result.

At any time during a search, we can choose to display the relevant part of the inverted index terms by keying "LOOK" command specifying the term or fragment of interest.

(a) Index term search:

When a single word or term is specified with the field prefix on "FIND" command option, the word or term is matched to the inverted index relevant to the prefix.

An example of specifying index search option :

TGT:082

(b) Range search :

The search bounded by two terms is performed, if an option of "FIND" command is specified as follows;

index-term1/index-term2

(c) Left-hand match search or right-hand match search :

The search beginning with stem or ending with stem is performed, if a search term truncated as follows;

prefix:stem*

 or

prefix:*stem

Here, "stem" is a character string which is a part of some word or term, and the asterisk * designates a wild card.

3.4 Display of retrieval results

We can see the results of retrieval by "DISPLAY" command. This command has options such as a record set number, field names or a number of records to be displayed. We can also choose any items among the names listed in the Field Identifier of Table-1 or in the Compound Field Name of Table-2 for the "DISPLY" command.

4. Concluding remarks

The Database currently contains the index data for the Charged-Particle Nuclear Reaction Data compiled only in the EXFOR Library. We will also add index data for those in the NRDF Library to the Database. Then the researchers will get benefit of the Database through the National Center for Science Information System and Hokkaido University Computing Center in the near future.

Acknowledgement

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Reference:

- [1] P.M. Attree, P.M. Smith: SYSTEM SPECIFICATION for the NDS DATA INDEX SYSTEM, 1979, IAEA-NDS-6.
- [2] HITAC Program product VOS3
Information Retrieval System ORION Database Administrator's Guide
- [3] HITAC Program Product VOS3 Information Retrieval System
ORION Online-User's Guide

Table-1. Databae Record Definitions

Field Identifier	Field Label	Indexed-Field & its Prefix	content
ACN	ACCESSION-NO	ACN:	EXFOR Accession Number
PNT	POINTER		
LNМ	LIB-NAME		
LFM	LIB-FORMAT	LIB:	
PSN	POSITION		
CNE	CONNECTOR		
KYF	KEYWORD-FLAG		
LOC	LOCATION		
RTYP	RCT-TYPE		Reaction Type
RCD	RCT-CODE		Reaction Code
TGT	TARGET	TGT:	Charge & Mass Number of Target
PRJ	PROJECTILE	PRJ:	Projectile
PRCSP	PROCBSS-PRTS	PRCSP:	Process Parts
PRCS	PROCESS		Reaction process
PRDUCT	RCT-PRODUCT		Reaction Product
PRDUCTS	PRODUCT-STATE		Product State
BRNCH	BRANCH		Branch
PRM	PARAMETER	PRM:	Parameter
PRTCL	PRTCL-CONSDRD		Particle Considered
MOD	MODIFIER		Modifier
DTYP	DATA-TYPE	DTYP:	Data type
MINF	EN-FLAG		Flag of Incident Energy
EMIN	EN-MIN		Minimum Value of Incident Energy
EMAXF	EN-FLAG		Flag of Incident Energy
EMAX	EN-MAX		Maximum Value of Incident Energy
YR	EXP-YEAR	YR:	Year of Experiment Performed
IN	INSTITUTE	IN:	Institute Experiment Performed
AU	AUTHOR	AU:	Name of First Author
RE	REFERENCE	RE:	
DTP	DATA-LINES		Data Points in Data-Table
VDT	VERSION-DATE	VDT:	
EDT	F-BNT-DATE	EDT:	File Entry Date
CHG	CHANGE-FLAG	CHG:	
ST	STATUS	ST:	
OAC	ORION-ACC		Record Id Number in ORION

Table-2. Compound Field

Compound Field Name	
EN	(MINF, EMIN, MAXF, EMAX)
LIB	(LNF, LFM)
RCT	(TGT, PRJ, PRCSP, PRCS, PRDUCT, PRDUCTS, BRANCHPRM, PRTCL, MOD, DTYP)

Table-3. Partial Indexing and Multi-valued Indexing Field

Field Name	
ACN	Partial(1:5)
TGT	Partial(1:6), Partial(1:3)
PRCSP	Multi
IN	Multi
ST	Multi

Fig.-1. Example of Retrieval

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READY
CPND
ORION 05-03
ENTER YOUR REQUEST
  1/ FIND PRJ:P AND TGT:016
* 13326 1/ PRJ:P
* 128 2/ TGT:016
* 45 3/ PRJ:P AND TGT:016
  4/ LOOK TGT:016*

. ITEMS.  TERMS
A 128 TGT:016
B 20 TGT:016000
C 92 TGT:016032
D 6 TGT:016033
E 10 TGT:016034
END OF TERMS WITH YOUR STEM
PICK LETTERS TO COMBINE
  4/ D
    6 ITEMS SAVED AS SET 4
CONTINUE PICKS OR REQUESTS
  5/ FIND 3 AND 4
* 6 5/ 3 AND 4
  6/ DISPLAY =5 ACN RCD EMIN EMAX FOR ALL

ITEM 1
  10. ACCESSION-NO C0252023
  110. RCT-CODE 16-S-33(P,X)9-F-18., SIG
  260. EN-MIN 0.30000E+09 EV
  280. EN-MAX 0.40000E+09 EV

ITEM 2
  10. ACCESSION-NO C0252024
  110. RCT-CODE 16-S-33(P,X)11-NA-22., SIG
      .
      .
      .

ITEM 6
  10. ACCESSION-NO C0252025
  110. RCT-CODE 16-S-33(P,X)11-NA-24., SIG
  260. EN-MIN 0.30000E+09 EV
  280. EN-MAX 0.40000E+09 EV

  6/ QUIT
GOODBYE
READY
```

* Keyined strings are underlined