

Role of family flags (family codes) in ZCHEX program

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A7 Zerkin (Continuing action) Summarize the role of family flags (also known as family codes, c.f. EXFOR Formats Manual Chapter 6) in ZCHEX (c.f. WP2017-11).

Family codes are described in “EXFOR Formats Manual” (6.11-6.13):

https://www-nds.iaea.org/nrdc/nrdc_doc/iaea-nds-0207-201508.pdf#page=49 and in

“EXFOR/CINDA Dictionary Manual” (Dictionary-24, pp:21-24):

https://www-nds.iaea.org/nrdc/nrdc_doc/iaea-nds-0213-201412.pdf#page=29

The flags are used to check (a) presence of dependent variables in DATA section and (b) correctness of codes in the keywords. Note: presence of independent variables is checked using “Data type flag” of Dictionary-24.

Family flags used in ZCHEX (revised/tested and confirmed now):

<*> for DATA, RATIO and derivatives are used and essential to define presents of dependent variables

<E><6>< ><S><L> are used for checking codes in EN-SEC, HALF-LIFE, MISC-COL, EMS-SEC, MOM-SEC

Conclusion.

Statement below marked in red is correct, and family flags should be maintained in the Dictionary-24.


Dictionary 24: Data headings

Line	Contents	Format	Archive	Trans	CHEX
1	Keyword	A10	13-22	1-10	x
	Data type flag (<i>see page 21</i>)	2I1	44-45	N/A	x
	Family flag	A1	46	66	x
	Plotting flag (<i>see page 22</i>)	I7	47-53	N/A	x
	Unit family code	A4	54-57	N/A	x
	Special use flag (presently not used)	A1	58	N/A	
	Expansion	A54	59-112	12-65	
	Special use flag	A4	119-122	N/A	
	RHI for relativistic heavy-ion reaction				
2+	Comment	A55	44-98	12-66	

The data headings are used in the COMMON and DATA sections to define the contents of data fields.

Keywords should be unique within Dictionary 24 and 25, *i.e.*, a data heading may not be identical to any data unit.

Many headings are identified by a data type flag, plotting flag and family flag, which are used for checking purposes and define the category (*i.e.*, independent variable, dependent variable, associated quantity or additional information) and the family (or independent variable type which is approximately equal to the 1st integer of the data type flag minus 2) within each category, according to the scheme in the following table.

 www-nds.iaea.org/nrdc/nrdc_doc/iaea-nds-0213-201412.pdf#page=20

A7 side-effect

ZCHEX was modified to give more informative error messages, e.g.

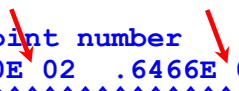
```
** Expected Family Flag /vs.Dict-24/   ANG1:[E][G]   21603002
** Illegal code field                   21603002
    EN-SEC      (ANG1,N) OUTGOING NEUTRON ANGLE.   21603002
               ^^^^
```

Note. Sometimes error messages, generated by ZCHEX, actually are caused either by inconsistency or mistakes in the (a) Dictionaries, (b) logic of checking or (c) by modified EXFOR format.

To test/confirm usage of a value of family flag, it's value can be changed (e.g., replaced by <space>) in DANBACK.ALL, run DANLO and ZCHEX on full EXFOR Master file.

Running ZCHEX on whole EXFOR gives opportunity to find some rare mistakes, for example: absence of sign + after "E" in scientific format

```
** Illegal floating point number
    1.300      .1730E 02 .6466E 00 .4500E-02   13104003
               ^^^^^^^^^^^^^^^^^^^^^
```



Statistics generated by ZCHEX (Ver-2022-06-09) on the file EXFOR-2022-06-10.bck:

```
Tape statistics
# of records-----> 24677055
# of entries----->   25442
# of subentries-----> 210717
# of new data subentries-> 164357
# of new entries----->   25442
# of warnings----->   20939
# of errors----->    47425
```

Probably, Error-report generated by ZCHEX on EXFOR Master file should be analysed in order to find severe typical errors (if any) and correct them.