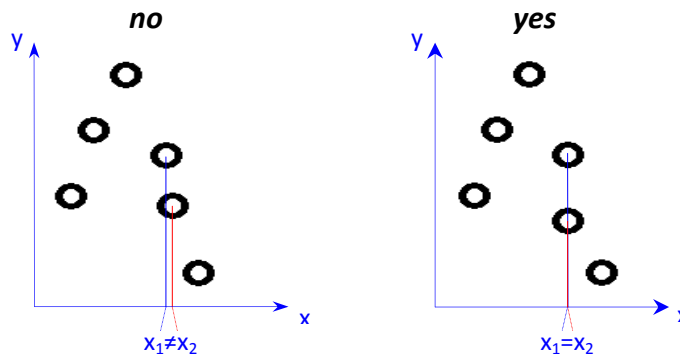


## Indication in EXFOR database and Web interface the full coincidence of values of independent variables of different data points in one dataset.

V.Zerkin, IAEA-NDS, 21-Apr-2013

EXFOR stores data presenting single valued functions in mathematical sense, i.e. “each element of the function's domain maps to a single, well-defined element of its range” [1], for example: cross section depending on incident energy -  $CS(E_{inc})$ .

### *EXFOR data points with coinciding independent variables:*



If in EXFOR  $\{x\}_1 = \{x\}_2$  and  $\{y\}_1 = \{y\}_2$ , it is completely duplicating data point, i.e. it is most likely mistake which should be corrected.

If  $x_1 = x_2$  and  $y_1 \neq y_2$ , and is necessary to present different data points with the same set of independent variables, EXFOR format offers to use variables FLAG or MISC\*. For example, variable FLAG is used for differentiating data obtained on different facilities. Also, data from reactions with modifier RAW in sub-field SF8 often have coinciding values of independent variables in different data points. Third big group of such data is the data digitized from figures with bad quality.

Some EXFOR users need to be informed about such a coinciding data, especially when their data formats do not allow such coincidence. For example, during development of software converting EXFOR to R33 format in 2008, special algorithm merging coinciding data by averaging central values and increasing uncertainties was developed [2]. In 2010 an automatic pipe-line was developed for exporting EXFOR data to IBANDL database using automatic conversion X4TOR33; after using it on regular basis the question of coinciding points was raised by A.Gurbich (IPPE, Obninsk, Russia) when visiting Nuclear Data Section. Since then, in 2011 I've decided to implement flagging of such cases in EXFOR database and to provide their indication in EXFOR Web interface:

Full coincidence of independent variables for different experimental points:

- r : raw data from the experiment
- f : having flag explaining the difference
- \* : without flag

Some of EXFOR data sets are having such coincidences really due to mistakes in compilation. Current EXFOR contains 1677 such Entries (3709 Subentries) which need further analysis. Analysis of cases for Area-4 (47 Entries, 81 Subentries) was done by M. Mikhaylyukova at the end of 2012.

Beyond finding mistakes in EXFOR data, other improvements of EXFOR system could be done. For example, generalizing results of analysis of Area-4 and in particular 40989004 and similar data, I have discovered a need to modify a flag in the Dictionary 024 allowing using THICKNESS as an independent variable

from: TRA 198202 THICKNESS                   83K000000THK Sample thickness  
to:    TRA 201212 THICKNESS                83K1000000THK Sample thickness

Variable THICKNESS is classified in the dictionaries as “Additional information”, but it is not allowed to be independent variable (due to the present flag in Dictionary-024). For example, reaction (74-W-0(N,TOT),,TRN,,AV) has reaction type “CS+” and quantity “Transmission”; according to present EXFOR Dictionaries this reaction should have one independent variable - incident energy (columns EN-MIN, EN-MAX). But in reality, 40989004 present data for different thickness of sample, therefore variable THICKNESS should also be recognized through EXFOR Dictionaries as independent variable. This can be achieved in several ways.

This subject might be discussed on NRDC Meeting 2013.

**References:**

1. [http://en.wikipedia.org/wiki/Single-valued\\_function](http://en.wikipedia.org/wiki/Single-valued_function)
2. [http://www-nds.iaea.org/exfor/x4guide/x4tor33/EXFOR\\_to\\_R33\\_conversion\\_algorithm\\_notes.pdf](http://www-nds.iaea.org/exfor/x4guide/x4tor33/EXFOR_to_R33_conversion_algorithm_notes.pdf)

# Appendix-1

ENTRY	40989	20110419	20110624	20110623	415240989000	1				
SUBENT	40989001	20110419	20110624	20110623	415240989001	1				
BIB	10	22			40989001	2				
TITLE	Experimental investigation of the resonance structure				40989001	3				
	of the total and scattering cross-sections of niobium				40989001	4				
	and tungsten in the neutron energy range 0.465 - 200				40989001	5				
	keV				40989001	6				
AUTHOR	(Yu.V.Grigor'ev,T.Bakalov,P.Vertesh)				40989001	7				
INSTITUTE	(4RUSFEI,4ZZZDUB)				40989001	8				
REFERENCE	(C,87KIEV,2,271,198709)				40989001	9				
	(T,GRIGORIEV,2005) Dissertation of Yu.Grigoriev.				40989001	10				
FACILITY	(REAC,4ZZZDUB) Fast pulse reactor IBR-30.				40989001	11				
	Cd, B-10, Co filters to suppress background neutrons.				40989001	12				
	Mn, Al filters to define background.				40989001	13				
DETECTOR	(PROPC) Battery of 16 He-3 counters				40989001	14				
MONITOR	No information				40989001	15				
METHOD	(TOF) Flight base is 1000 m				40989001	16				
	(TRN) Transmission and self-indication.				40989001	17				
STATUS	Data are taken from the reference				40989001	18				
HISTORY	(19890914C) Compiled at the centre - CJD				40989001	19				
	(19901017U) 'AV' added in SAN 002, 003				40989001	20				
	(19990805U) Dates corrected				40989001	21				
	(20110419A) M.M. Upper -> lower case correction.				40989001	22				
	STATUS lines were added.Subent 003 data were corrected.				40989001	23				
	ERR-ANALYS and COMMON information was corrected.				40989001	24				
ENDBIB	22				40989001	25				
NOCOMMON	0 0				40989001	26				
ENDSUBENT	25				40989001	99999				
SUBENT	40989004	20110419	20110624	20110623	415240989004	1				
BIB	5	8			40989004	2				
REACTION	(74-W-0(N,TOT),,TRN,,AV) Transmission.				40989004	3				
SAMPLE	Metal W (99.9%) discs of 80 mm diameter.				40989004	4				
	Thickness:				40989004	5				
	mm	1	2	4	8	12	16	22	40989004	6
	at/b 0.00496 0.01005 0.0200 0.0396 0.0593 0.0788 0.108				40989004	7				
ERR-ANALYS	(DATA-ERR) Not explained, probably total.				40989004	8				
STATUS	(TABLE) Table 26 of T,GRIGORIEV,2005.				40989004	9				
HISTORY	(20110419A) M.M. Subent was added.				40989004	10				
ENDBIB	8				40989004	11				
NOCOMMON	0 0				40989004	12				
DATA	5 70				40989004	13				
EN-MAX	EN-MIN	THICKNESS	DATA	DATA-ERR	40989004	14				
KEV	KEV	ATOMS/B	NO-DIM	NO-DIM	40989004	15				
200.	100.	0.00496	0.957	0.005	40989004	16				
200.	100.	0.01005	0.919	0.005	40989004	17				
200.	100.	0.0200	0.846	0.004	40989004	18				
200.	100.	0.0396	0.727	0.003	40989004	19				
200.	100.	0.0593	0.619	0.003	40989004	20				
200.	100.	0.0788	0.519	0.002	40989004	21				
200.	100.	0.108	0.417	0.004	40989004	22				
100.	46.5	0.00496	0.946	0.006	40989004	23				
100.	46.5	0.01005	0.905	0.005	40989004	24				
100.	46.5	0.0200	0.819	0.004	40989004	25				
100.	46.5	0.0396	0.679	0.003	40989004	26				
100.	46.5	0.0593	0.555	0.003	40989004	27				
100.	46.5	0.0788	0.454	0.003	40989004	28				
100.	46.5	0.108	0.360	0.002	40989004	29				
46.5	21.5	0.00496	0.935	0.005	40989004	30				
46.5	21.5	0.01005	0.887	0.006	40989004	31				
46.5	21.5	0.0200	0.804	0.005	40989004	32				
46.5	21.5	0.0396	0.639	0.004	40989004	33				
46.5	21.5	0.0593	0.507	0.003	40989004	34				
46.5	21.5	0.0788	0.403	0.002	40989004	35				
46.5	21.5	0.108	0.317	0.002	40989004	36				
. . . . .										
	0.215	0.100	0.00496	0.785	0.013	40989004	79			
	0.215	0.100	0.01005	0.562	0.010	40989004	80			
	0.215	0.100	0.0200	0.507	0.009	40989004	81			
	0.215	0.100	0.0396	0.416	0.008	40989004	82			
	0.215	0.100	0.0593	0.295	0.006	40989004	83			
	0.215	0.100	0.0788	0.212	0.056	40989004	84			
	0.215	0.100	0.108	0.198	0.003	40989004	85			
ENDDATA	72				40989004	86				
ENDSUBENT	85				40989004	99999				
ENDENTRY	2				4098999999999					