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

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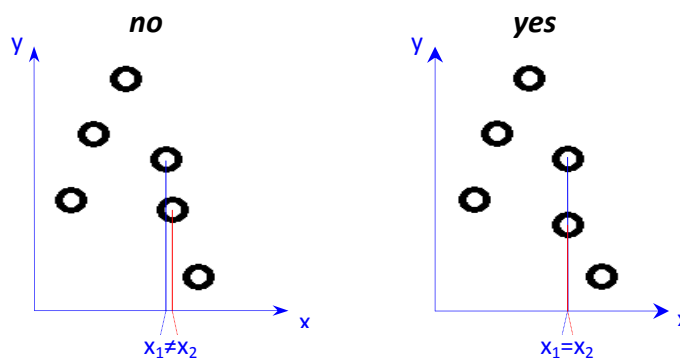
If in EXFOR $\{x\}_1=\{x\}_2$ and $\{y\}_1=\{y\}_2$, it is completely duplicating data point, i.e. it is most likely mistake which should be corrected.

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-3 (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   83K0000000THK 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
2. http://www-nds.iaea.org/exfor/x4guide/x4tor33/ EXFOR_to_R33_conversion_algorithm_notes.pdf

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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                                           4098900199999
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
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    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                                          4098900499999
ENDENTRY           2                                          4098999999999
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