**Nuclear Data Section**

**International Atomic Energy Agency**

**P.O.Box 100, A-1400 Vienna, Austria**

**Memo CP-D/1007**

**Date:** 24 December 2020

**To:** Distribution

**From:** N. Otsuka

**Subject: LEXFOR “Fitting Coefficients” – LEG/RS0 and LEG/RSD**

LEXFOR “Fitting Coefficients” defines DA,,LEG/RS0 and DA,,LEG/RSD as follows:

DA,,LEG/RS0 = Bl (units NO-DIM) where:

$$\frac{dσ}{dΩ}\left(E,θ\right)=\frac{dσ}{dΩ}\left(E,0°\right)\sum\_{l=1}^{n}a\_{l}\left(E\right)P\_{l}\left(\cos(θ)\right)$$

DA,,LEG/RSD = Bl (units NO-DIM) where:

$$\frac{dσ}{dΩ}\left(E,θ\right)=\frac{dσ}{dΩ}\left(E,90°\right)\sum\_{l=1}^{n}a\_{l}\left(E\right)P\_{l}\left(\cos(θ)\right)$$

Due to absence of the *l*=0 term, the integration of the right-hand side over the whole solid angle gives zero. This is strange! I found they were defined differently in an old LEXFOR entry (IAEA-NDS-3 Rev.96/11):



For DA,,LEG/RSD, however, I do not see a reason to fix the 0th order term to 1 (*i.e.*, the angular integrated cross section is not necessary to be 4π times the 90 deg angular differential cross section in general.). I propose the following definitions:

DA,,LEG/RS0 = *al* (units NO-DIM) where:

$$\frac{dσ}{dΩ}\left(E,θ\right)=\frac{dσ}{dΩ}\left(E,0°\right)\left[a\_{0}+\sum\_{l=1}^{n}a\_{l}\left(E\right)P\_{l}\left(\cos(θ)\right)\right]$$

DA,,LEG/RSD = *al* (units NO-DIM) where:

$$\frac{dσ}{dΩ}\left(E,θ\right)=\frac{dσ}{dΩ}\left(E,90°\right)\left[a\_{0}+\sum\_{l=1}^{n}a\_{l}\left(E\right)P\_{l}\left(\cos(θ)\right)\right]$$

There are many data sets compiled with one of these quantities without the 0th order coefficient, and they are suspicious. I checked such questionable entries and found that LEG/RS0 or LEG/RSD are often wrongly used for the coefficients for the expansion *W*(*θ*)=1+*a*1*P*1+*a*2*P*2+…which must be coded with LEG/**RS**. Below is a summary from my quick review, and the originating centre is asked to check each case against the source article before correction and retransmission.

SF8 must be LEG/RS.

41027.003, 41136.003, 41140.004, 41615.004, 41660.002+004, 41684.002-003, 41685.005+006, A1156.008+009, A1358.004, C1361.004, C1499.0004-005, F0216.004, F0360.005, F0397.003+005, F0475.002, M0283.013-022, O1347.004.

SF8 must be probably LEG/RS (though the expansion formula is not given in the article or wrong).

40354.003, A1357.004, M0879.003-004

SF8 must be RSD.

41616.008-011

SF8 must be COS/RS.

F0013.004

Not clear

23411.002-003, 30455.003, 40449.002, O1195.004

**Distribution:**

a.koning@iaea.org

abhihere@gmail.com

aloks279@gmail.com

bknayak@barc.gov.in

daniela.foligno@oecd-nea.org

dbrown@bnl.gov

draj@barc.gov.in

fukahori.tokio@jaea.go.jp

ganesan555@gmail.com

gezg@ciae.ac.cn

iwamoto.osamu@jaea.go.jp

j.c.sublet@iaea.org

jmwang@ciae.ac.cn

kaltchenko@kinr.kiev.ua

kenya.suyama@oecd-nea.org

kimdh@kaeri.re.kr

kimura.atsushi04@jaea.go.jp

l.vrapcenjak@iaea.org

manuel.bossant@oecd-nea.org

masaaki@nucl.sci.hokudai.ac.jp

michael.fleming@oecd-nea.org

mmarina@ippe.ru

nicolas.soppera@oecd-nea.org

n.otsuka@iaea.org

nrdc@jcprg.org

odsurenn@gmail.com

ogritzay@ukr.net

ogrudzevich@ippe.ru

otto.schwerer@aon.at

pikulina@expd.vniief.ru

pritychenko@bnl.gov

s.okumura@iaea.org

samaev@obninsk.ru

sbabykina@yandex.ru

scyang@kaeri.re.kr

selyankina@expd.vniief.ru

sonzogni@bnl.gov

stakacs@atomki.mta.hu

stanislav.hlavac@savba.sk

sv.dunaeva@gmail.com

tada@nucl.sci.hokudai.ac.jp

taova@expd.vniief.ru

tarkanyi@atomki.hu

vvvarlamov@gmail.com

v.zerkin@iaea.org

vidyathakur@yahoo.co.in

vsemkova@inrne.bas.bg

yolee@kaeri.re.kr

zholdybayev@inp.kz