



JENDL-3.3 & JEFF-3.1 NJOY99.90 deterministic code module updates

J-Ch Sublet, K Kosako¹ and A Trkov²

CEA Cadarache, DEN/DER/SPRC, 13108 St Paul Lez Durance, France

¹ Shimizu Corporation, Koto-ku, Tokyo 135-8530, Japan

² IAEA, Wagramer Strasse 5, A-1400 Vienna, Austria

Background



- Some of the JEFF-3.1 files were adopted from JENDL-3.3, which makes use of interpolation law 22 for neutron emission spectra, which is administratively forbidden in ENDF-6 and is not supported by all NJOY modules
- JAERI-Data/Code 2003-011
"NJOY cannot deal with unit base interpolation INT=22 in MF5 and MF6. GROUPR was modify so as to process data with INT=21-25"
- A patch to NJOY has already been developed within the JENDL project, in fact two
- ACER and so MCNP is not affected
- TRIPOLI-4.4 has been modified accordingly



- The Shimizu corporation updates have been engineered
 - for NJOY99.67 (12feb02)
 - for NJOY99.81 (2dec02)
- Both have been implemented and tested successfully in Japan on the JENDL-3.3 library (else it would have been difficult to realistically calculate a LWR with a deterministic code, no matrices produced for the MT's concerned)
- The second update has been preferred to the first one
- It includes as well an increase in the array size for the Legendre coefficients (65) and an increase of MATXS dimension
- Tested successfully on JEFF-3.1T3 with APOLLO XMAS and ERANOS ECCO libraries

Others CEA updates:

- All new additional group structures with 7 significant decimal digits compatible with CALENDF:
 - 19 ecco 33-group structure
 - 20 ecco 1968-group structure
 - 21 tripoli 315-group structure
 - 22 xmas LWPC 172-group structure
 - 23 vit-J LWPC 175-group structure
- increase the size of egn from 641 to 15000 i.e DICE 13193 APOLLO 11276
- Increase of Legendre terms in h6ddx, heatr (65, Mo95 BVII)
- increase the size of storage array to handle certain group input figures, flux calculator numbers



NJOY99.90+

- IAEA Fortran fixes
- JAERI heatr update, energy balance / kinematic
- IAEA groupr Be-9 fixes (875-891 (n,2n_{0-c}))
- Implement changes proposed by M. Mattes for thermr, leapr and acer from http://www-nds.iaea.org/indltsl/NJOY99_mmlKE.upd
-
- The ENDF file formats and the maintenance of the code are closely related. It would make sense to address them in a coordinated manner



Some thoughts



- SAMMY is a widely used code for resonance analysis. However, the FITACS module for deriving the average resonance parameters in the unresolved resonance range uses formulation, which is inconsistent with ENDF-6 format.
- The FITACS formalism is considered more advanced, so forcing SAMMY to follow strictly ENDF rules might be a step backwards. In addition, the HARFOR approach has been proposed through IRMM/Bulgarian collaboration, which is based on Reich-Moore formalism.
- Whatever the decision for the preferred option, the inconsistency needs to be resolved

Neutronic codes usually uses NJOY **complete** file as input and not SAMMY cross section only outputs

Conclusions

NJOY99.90

*ident up90 */ purr -- 6aug03

- In benchmarking the new libraries, a number of processing problems were identified, which require modifications to NJOY
- Some of the proposed updates collected from different sources might be contradictory, others might be inconsistent with the general programming style
 - Is the removal of up63, in the NRG ACER update to handle the new delayed 8 groups data without impact on how other modules handled this new data ??
- A review and consolidation of the proposed updates from non-US users might be beneficial before requesting code modifications from the custodian of NJOY