Proposal for Data Adjustment Method Evaluation (Revised with Comments)

G. Palmiotti

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INL
Idaho National Laboratory

List of Participants

- The following organizations have expressed interest in participating to the “Data Adjustment Method Evaluation Exercise”:
  - ANL
  - CEA
  - CIAE
  - INL
  - IPPE
  - JAEA
  - Jozef Stefan Institute
  - NRG

Goals

- Assess if in a multigroup nuclear data adjustment we end up with the same (similar) set of isotope cross sections when a common shared set of integral experiments is used and different data adjustment methodologies are used.
- Assess the impact of using different starting cross section libraries and/or different covariance matrices.
- Assess if the attained reduced uncertainties on a target design for a set of integral parameters of interest is consistent among the different solutions.
- Comments: In general agreed that goals are quite ambitious, but possibly attainable with a large and well coordinated effort by participants.

Premises

- Proposed list of experiments (openly available):
  - GODIVA: critical mass, spectral indices (F8/F5, F9/F5)
  - JEZEBEL: critical mass. spectral indices (F8/F5, F9/F5)
  - ZPR6 6A: critical mass
  - ZPR6 7: critical mass, critical mass high Pu240 content, spectral indices at center (TBD), sodium void (one configuration), control rods (one configuration)
- Comments: Many comments, mostly to add experiments and parameters, other than K_{eff}, to be calculated. A session is devoted to the discussion of this issue.

Premises

- Each participant will use his own nuclear data library (e. g. ENDF/B-VII, JEFF 3.2, JENDL 3.3, BROND-3, CENDL, etc.)
- Comments: No major comments on this item.

- Hopefully, a common multigroup structure can be agreed and adopted for performing the data adjustment. Initial proposition: 33 groups of AFCI (GNEP, ERANOS).
- Comments: In general agree to use one energy group structure, but IPPE uses 28 groups, and CIAE 30 groups. A session is devoted to discuss this issue.

Premises

- Proposed list of isotopes to be adjusted: B10?, O16, Na23, Fe56, Cr52, Ni58, U235, U238, Pu239, Pu240, Pu241?,..
- Comments: Some agree that list is adequate, but some that there are too many. Of course, this item is strictly related to the choice of experiments, because we need experiments that provides significant sensitivity to the isotopes considered.
- Proposed list of reactions to be adjusted: fission, nubar, capture, elastic (group integrated, not matrix), inelastic (group integrated, not matrix)
- Comments: many have proposed to add fission spectrum and mubar.
- A session is devoted to discuss these two items.

Premises

- Each participant will use his own covariance matrix. If not available, a common set of covariances can be adopted or provided.
- Comments: A two step procedures has been proposed by CEA. In the first phase each participant use their own, an in the second one a common covariance matrix is used in order to identify methodology only effects. Warning: this issue needs to be coordinated with the multigroup energy structure choice. A session is devoted to discuss the covariance matrix use and strategy.

Premises

- Proposed target design where uncertainty have to be reduced: ABR (oxide fuel) or ?
- Proposed list of integral parameters which uncertainty has to be calculated: K_{eff}, power peak, sodium void, Doppler, control rod reactivity, ?
- Comments: general consensus to adopt only one simple fast reactor design with no minor actinide present. ABR could be adopted. The oxide fuel version seems more appropriate in view of the available experiments mostly devoted to oxide fuel. If there is agreement, ANL should distribute, if possible, a simplified version (cylindrical model) to participants.

Comparison of Results

- At the end of the exercise each participant will provide a set of multigroup adjusted infinite dilution (because we are dealing with fast reactors, self-shielding effects are considered second order) cross sections and possibly the new associated covariance matrix.
- The old and new covariance matrix should be used for computing the initial and reduced uncertainty on the target design for the integral parameters of interest
- A volunteer participant, using these cross sections, sensitivity coefficients, and the provided covariance matrix can assess differences and their impact on the experimental integral parameters.
- If, hopefully, consensus is reached, feedback could be provided to the different evaluator teams (ENDF, JEFF, JENDL, BROND, CENDL) on which isotope, reaction, and energy range needs to be improved.
- Comments: Not many comments on the results comparison, but we need to agree on this point.