Performance of the New ORNL ^{55}Mn Evaluation

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Most discrepant benchmark analysis with ENDF/B-VII.0 ZPR-6/10 (A clean Pu/C/SST assembly)

PU-MET-INTER-002	Pu/C/Steel core – Steel reflector, Iron radial reflector – 6.25 v/o Pu / 37.5 v/o C / 56.25 v/o steel unit cell	
	k_{eff}	C – E (in % Δk)
Experiment	1.0016 ± 0.0013	
ENDF/B-V	1.0009 ± 0.0007	0.07 ± 0.15
ENDF/B-VI	1.0380 ± 0.0005	3.64 ± 0.14
ENDF/B-VII.0	1.0392 ± 0.0003	3.76 ± 0.13

- Note that there was NO bias with ENDF/B-V data.
- Using ENDF/B-VII.0 data with ENDF/B-V data for [239]Pu : reduces C/E by 1.1% Δk
- Using ENDF/B-VII.0 data with ENDF/B-V data for Cr : reduces C/E by 1.7% Δk
- Using ENDF/B-VII.0 data with ENDF/B-V data for Mn : reduces C/E by 0.6% Δk
- Using ENDF/B-VII.0 data with new ORNL data for Mn : reduces C/E by 0.6% Δk

2. RESONANCE PARAMETERS

From 1 keV to about 900 keV, the parameters are derived from recent ORNL (AG84) and Geel (BR86, RO89) transmission data. Unfortunately, the reported resonance parameters were obtained by analyzing individual energy regions of the experimental data independently, with the same nuclear radius and set of dummy resonances not necessarily used for each region. Thus, simply adopting the resonance parameters and generating pointwise cross sections from them yield results which are often in poor agreement with the original experimental data. ……Further work needs to be done to provide a consistent, accurate set of resonance parameters commensurate with the quality of those in the iron and nickel evaluations.

It has been noted:

- **Results for ZPR-6/10 using ENDF/B-VII.0 data indicate:**

  - **Bias from low energy data for modern ^{239}Pu evaluations is long-standing and consistent with general over-prediction of Pu solution criticals – new evaluation should be high priority for ENDF/B-VII**

  - **Bias from low energy data for modern isotopic Cr evaluations is now evident – new evaluation should be high priority for ENDF/B-VII**

  - **Re-evaluation of Mn data eliminates the bias introduced by the ENDF/B-VI (-VII.0) evaluation.**