

Characteristic Energy for Prompt Fission Neutron Spectrum

Memo CP-D/675 (N.Otsuka, 2010-12-22)

After Consultants' Meeting on Standards Updating and Extending (13-15 October 2010, Vienna), I revised EXFOR entries for dosimetry cross sections with ^{252}Cf and ^{235}U prompt fission neutron spectra (PFNS) measured by Prof. Katsuhei Kobayashi (KUR, Japan), and also discussed them with Dr. Wolf Mannhart (PTB, Germany). Then I found that search of cross sections for a specific PFNS in the EXFOR library is not very easy. For ^{252}Cf spontaneous fission PFNS, we have a specific incident source code CF252. But we do not have a similar code for $^{235}\text{U}(n,f)$ PFNS case.

Wolf proposes use of specific spectrum temperature values instead of EN-DUMMY=1.5 MeV for ^{252}Cf and ^{235}U PFNS cases, and I think this is a good idea.

Because ^{252}Cf and ^{235}U PFNS are well approximated by Maxwellians with $kT=1.42$ MeV and 1.32 MeV, respectively, we may code these values under KT when ^{252}Cf and ^{235}U PFNS are considered. We may also consider a new incident source code (e.g., U235) if we regard it helps data search.

The $^{235}\text{U}(n,f)$ PFNS has incident neutron energy dependence, and it is not considered in above proposal. However, Wolf explains that the shape of the ^{235}U spectrum changes only weakly between thermal and about 1 MeV incident neutron energy, and he believes that there exists only a very limited number of $\langle\sigma\rangle$ measurements performed at high neutron energies.”