Short Comment to Iron Data in JENDL-3.3

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We presented analysis results of the iron integral experiment at JAEA FNS with recent nuclear data libraries (JENDL-3.3, FENDL-2.1, JEFF-3.1 and ENDF/B-VII.0) and MCNP-4C at the last symposium on nuclear data. The calculation with JENDL-3.3 overestimated measured neutrons below ~ 10 keV for the iron experiment, while other calculations agreed with the measurements well. Thus we investigate what of the iron data in JENDL-3.3 causes the overestimation based on ENDF/B-VII.0.

The Sn code DORT was used for this analysis because this code gives almost the same results as MCNP quickly. Multigroup libraries with self-shielding correction were produced with the TRANSX code from MATXS files. The MATXS files supplied from JAEA Nuclear Data Center were adopted for JENDL-3.3. Since MATXS files for ENDF/B-VII.0 were not released officially, they were produced with the NJOY99.161 code and patch from BNL National Nuclear Data center for ourselves.

In order to examine which iron isotopes caused the overestimation, we calculated neutron spectra of the iron experiment with DORT, where iron isotopes in JENDL-3.3 were replaced with those in ENDF/B-VII.0 one by one. As a result, it was found out that the Fe-57 data in JENDL-3.3 caused the overestimation of measured neutrons below ~ 10 keV in the iron experiment. The elastic and first inelastic scattering cross section data of Fe-57 in JENDL-3.3 was different from that in ENDF/B-VII.0 largely. It was confirmed that the first inelastic scattering cross section of Fe-57 in JENDL-3.3 caused the overestimation of the iron experiment through the DORT calculations where the elastic and first inelastic scattering cross section data of Fe-57 in JENDL-3.3 were replaced with those in ENDF/B-VII.0 separately. The Fe-57 data should be revised in JENDL-4.

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Background

❑ **We presented analysis results of the iron integral experiment at JAEA FNS with recent nuclear data libraries and MCNP-4C at the last symposium.**

- **Calculation with JENDL-3.3 overestimated measured neutrons below ~ 10 keV for the iron experiment**, while other calculations agreed well.

Experimental configuration
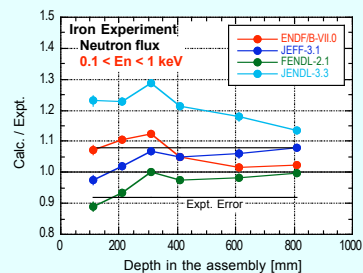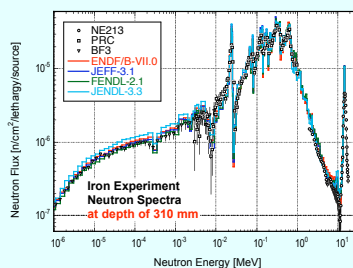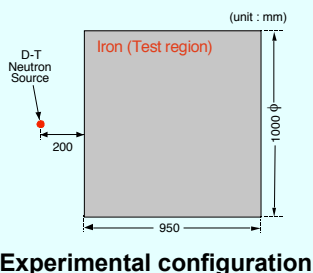
Objective

❑ **To investigate what of the iron data in JENDL-3.3 caused the overestimation based on ENDF/B-VII.0.**

Method

❑ **Code : Sn Code DORT** (which gives almost the same results as MCNP quickly)

❑ **Multigroup libraries with self-shielding correction were produced with TRANSX code from MATXS files of JENDL-3.3** (from JAEA Nuclear Data Center) **and ENDF/B-VII.0** (processed with NJOY99.161).

Results and Discussion
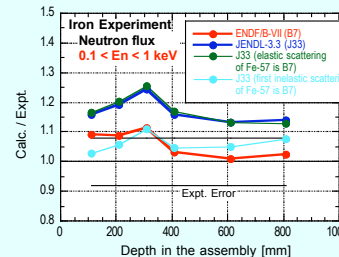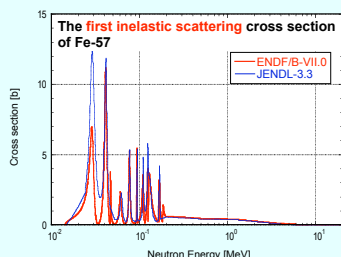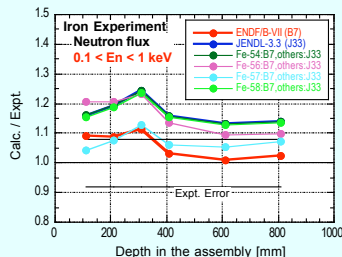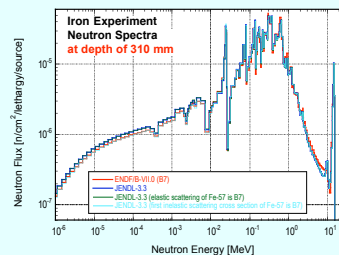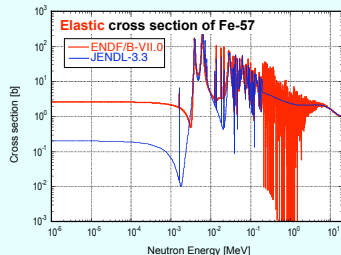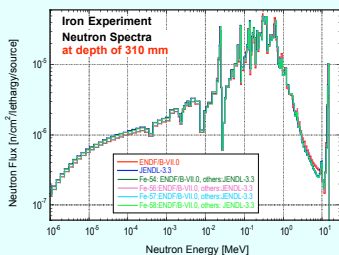
Fe-57 in JENDL-3.3 causes the overestimation!

MT2 and MT51 of fe-57 are largely different between JENDL-3.3 and ENDF/B-VII.0.

MT51 of fe-57 in JENDL-3.3 causes the overestimation!!

Conclusion

❑ **The first inelastic scattering cross section data of Fe-57 in JENDL-3.3 caused the overestimation of measured neutrons below ~ 10 keV in the iron integral experiment at JAEA/FNS.**

❑ **Fe-57 data should be revised in JENDL-4.**