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Study on impact of ENDF/B-VII.0 nuclear library uncertainty on the CERMET fueled ADS reactivity calculation using MCNP6 and WHISPER

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In previous studies, the great potential in transmutating transuranic elements from spent nuclear fuel of the accelerator-driven system (ADS) was confirmed by the calculation results obtained by the Monte Carlo method simulation codes. The fast neutron spectrum system showed a benefit for reducing minor actinide (MA) inventories in the fuel cycle. However, the reliability of the calculation data directly depends on the accuracy of the cross section library. The uncertainty of the evaluated nuclear data, especically, in the high energy range would result in an inaccuracy in the reactivity estimation of the ADS system. In this study, the impact of the ENDF/B-VII.0 nuclear library uncertainty on reactivity prediction of the CERMET (ceramic metal matrix) fueled ADS was investigated using WHISPER. It was found that the inaccuracy of ENDF/B-VII.0 library caused a big uncertainty (about 1100 pcm) in the reactivity calculation result. From the sensitivity analyses obtained by MCNP6 code, the uncertainty of elastic scattering and absorption cross sections of 95Mo, fission cross sections of 237Np, 239Pu, 241Am and 244Cm mainly contributes to the uncertainty of the calculation's result. Consequently, it is highly recommended that the accurary of those isotopes'cross sections needs to be enhanced to provide more reliable results on reactivity calculation for the fast system.

Minioral

Yes

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No

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No

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