PIE Analysis for Minor Actinide

Kenya SUYAMA

Japan Atomic Energy Research Institute

Tokai-mura, Ibaraki-ken, 319-1195, Japan

kenya@cyclone.tokai.jaeri.go.jp

Minor Actinide (MA) has been a key issue in the nuclear data evaluation. One of the reasons is reactivity change due to MA should be considered in the fuel design, especially of MOX fuel. Another reason is MA is a main target in the strategy of partitioning and transmutation (P&T) of long-life radioactive isotopes. Cross section data of MA are an important parameter to evaluate the performance of P&T facility. Of course, concerning the property of spent fuel (SF), amount of MA defines α-radioactivity, decay heat, and neutron emission rate. It also affects the criticality of SF.

Validation of calculation codes and libraries has been carried out by comparison between calculation results and experimental data. However, required data of high burnup fuel taken by Post Irradiation Examinations (PIE) are not enough as shown in **Table 1**, and many analyses present large discrepancies between calculations and PIE data. To improve the calculation, well-organized comparison using several codes and libraries are essential. This report describes a status of measured isotopic composition data of MA taken by PIE, and several studies to obtain useful information from comparison between calculations and experimental results. It includes examples of PIE data for UO_2 and MOX fuel, PIE analysis results by French institute, and comparison of MA amount between calculations using JENDL-3.2 and JENDL-3.3.

Table 1 Number of PIE Data in Unclassified Reference

	Number of Samples			Number of Assembly	Number of Fuel Pin	Burnup [GWd/t]			
	Total	Taken from				0 - 19.99	20.00 - 29.99	30.00 - 39.00	40.00 - 60.0
		PWR	BWR						
^{237}Np	53	29(5)*	24(2)	12	15	14	12	19	8
^{238}Pu	128	88(7)	40(3)	18	41	27	55	38	8
^{241}Am	107	69(7)	38(3)	17	38	26	41	32	8
^{243}Am	65	47(6)	18(1)	11	20	14	25	20	6
^{244}Cm	110	76(6)	34(2)	13	34	24	51	29	6
^{245}Cm	28	11(1)	17(1)	2	4	5	5	12	6

Figures in ( ) are numbers of reactors.