

RBEC benchmark revised report

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1. Neutron balance

First, Table.1 shows the comparison of neutron balance at BOC between our result and SRAC-Citation result, where SRAC-Citation is made by Japan Atomic Energy Agency (JAEA).

Our code uses microscopic cross sections which are prepared by SRAC PIJ code. Both results are almost same. Therefore, we continued to calculate this code to the end of cycle by using our code system. Table.2 shows neutron balance in MOC and EOC.

Table.1 Neutron balance in Core1. BOC

	Our result			SRAC-Citation		
	Capture	Fission	Generation	Capture	Fission	Generation
U235	2	7	18	2	7	18
U238	1051	127	345	1041	128	349
Pu238	5	9	27	5	9	27
Pu239	167	667	1964	165	667	1963
Pu240	73	54	161	73	55	161
Pu241	23	126	374	23	125	373
Pu242	13	8	23	13	8	23
OtherHM	9	1	4	9	1	4
FP	0	0	0	0	0	0
Clad	51	0	0	51	0	0
Cool	37	0	0	33	0	0
Sum	1430	1000	2917	1414	1000	2919

Table.2 Neutron balance in Core.1. MOC and EOC

Tokyo Tech	MOC			EOC		
	Capture	Fission	Generation	Capture	Fission	Generation
U235	1	4	11	1	3	7
U238	956	119	324	895	113	307
Pu238	4	8	23	4	8	22
Pu239	174	713	2099	176	730	2151
Pu240	76	58	171	80	62	183
Pu241	16	87	258	13	71	212
Pu242	13	8	23	12	7	23
OtherHM	18	4	12	23	5	18
FP	90	0	0	172	0	0
Clad	49	0	0	49	0	0
Cool	36	0	0	36	0	0
Sum	1433	1000	2921	1462	1000	2923

2. Nuclear densities in BOC, MOC, and EOC

In the latest report, our results were not cell-averaged number densities. Therefore, new number densities (cell averaged densities) were recalculated and shows in Table.3.

Table.3 Number densities in BOC, MOC and EOC

	Core1			Lateral blanket		
	BOC	MOC	EOC	BOC	MOC	EOC
U238	6.360E-03	5.974E-03	5.626E-03	1.037E-02	1.025E-02	1.012E-02
Pu239	6.072E-04	6.607E-04	6.770E-04		1.094E-04	2.105E-04
Pu240	2.433E-04	2.598E-04	2.757E-04		1.575E-06	5.948E-06
Pu241	6.360E-03	5.906E-05	4.869E-05		1.676E-08	1.148E-07

3. Fission products parameters

Table.4 shows number densities and macroscopic absorption cross sections of each fission products.

Table.4 number densities and macroscopic absorption cross sections of each fission products

MOC				
	Core.1		Lateral blanket	
	ρ , 1/(barn.cm)	Σ a, 1/cm	ρ , 1/(barn.cm)	Σ a, 1/cm
Ru-101	1.849E-05	1.115E-05	8.326E-07	6.814E-07
Rh-103	2.118E-05	1.224E-05	8.162E-07	6.099E-07
Pd-105	1.611E-05	1.313E-05	5.842E-07	6.164E-07
Tc-99	2.061E-05	1.088E-05	8.765E-07	6.138E-07
Pd-107	1.047E-05	9.185E-06	2.621E-07	3.086E-07
Cs-133	2.219E-05	8.094E-06	9.444E-07	5.148E-07
Sm-149	3.735E-06	5.856E-06	1.978E-07	5.060E-07
Other fission products	5.535E-04	7.398E-05	2.385E-05	4.427E-06
Integrated fission products				
Total	6.663E-04	1.445E-04	2.837E-05	8.278E-06
EOC				
	ρ , 1/(barn.cm)	Σ a, 1/cm	ρ , 1/(barn.cm)	Σ a, 1/cm
Ru-101	3.417E-05	2.061E-05	2.151E-06	1.760E-06
Rh-103	4.382E-05	2.532E-05	2.289E-06	1.711E-06
Pd-105	2.977E-05	2.427E-05	1.615E-06	1.704E-06
Tc-99	4.086E-05	2.157E-05	2.305E-06	1.614E-06
Pd-107	1.950E-05	1.711E-05	8.064E-07	9.493E-07
Cs-133	4.224E-05	1.541E-05	2.482E-06	1.353E-06
Sm-149	6.341E-06	9.942E-06	4.797E-07	1.227E-06
Other fission products	1.093E-03	1.455E-04	6.237E-05	1.168E-05
Integrated fission products				
Total	1.309E-03	2.797E-04	7.450E-05	2.200E-05

4. Neutron multiplication factor

In the past report, some nuclide data in the input data were wrong. Therefore, new input data were made and cycle calculation was performed.

Fig.1 and Table.5 show effective neutron multiplication factor in Mode.1

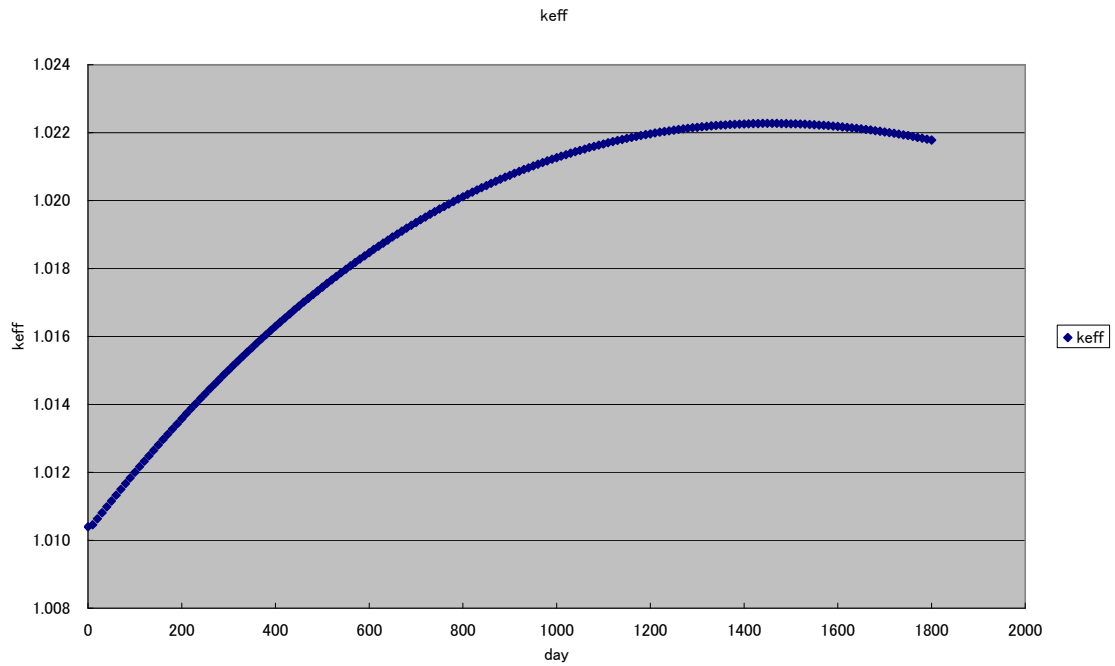


Table.5 Effective neutron multiplication factor

day	keff	day	keff	day	keff
0	1.0104				
10	1.0105	310	1.0151	610	1.0186
20	1.0106	320	1.0153	620	1.0187
30	1.0108	330	1.0154	630	1.0187
40	1.0110	340	1.0155	640	1.0188
50	1.0112	350	1.0157	650	1.0189
60	1.0113	360	1.0158	660	1.0190
70	1.0115	370	1.0159	670	1.0191
80	1.0117	380	1.0161	680	1.0192
90	1.0118	390	1.0162	690	1.0193
100	1.0120	400	1.0163	700	1.0194
110	1.0122	410	1.0164	710	1.0194
120	1.0123	420	1.0165	720	1.0195
130	1.0125	430	1.0167	730	1.0196
140	1.0126	440	1.0168	740	1.0197
150	1.0128	450	1.0169	750	1.0197
160	1.0130	460	1.0170	760	1.0198
170	1.0131	470	1.0171	770	1.0199
180	1.0133	480	1.0172	780	1.0200
190	1.0134	490	1.0173	790	1.0200
200	1.0136	500	1.0175	800	1.0201
210	1.0137	510	1.0176	810	1.0202
220	1.0139	520	1.0177	820	1.0202
230	1.0140	530	1.0178	830	1.0203
240	1.0142	540	1.0179	840	1.0204
250	1.0143	550	1.0180	850	1.0204
260	1.0145	560	1.0181	860	1.0205
270	1.0146	570	1.0182	870	1.0206
280	1.0147	580	1.0183	880	1.0206
290	1.0149	590	1.0184	890	1.0207
300	1.0150	600	1.0185	900	1.0207

Table.5 Effective neutron multiplication factor (cont.)

day	keff	day	keff	day	keff
910	1.0208	1210	1.0220	1510	1.0223
920	1.0209	1220	1.0220	1520	1.0223
930	1.0209	1230	1.0220	1530	1.0222
940	1.0210	1240	1.0221	1540	1.0222
950	1.0210	1250	1.0221	1550	1.0222
960	1.0211	1260	1.0221	1560	1.0222
970	1.0211	1270	1.0221	1570	1.0222
980	1.0212	1280	1.0221	1580	1.0222
990	1.0212	1290	1.0221	1590	1.0222
1000	1.0213	1300	1.0222	1600	1.0222
1010	1.0213	1310	1.0222	1610	1.0222
1020	1.0214	1320	1.0222	1620	1.0222
1030	1.0214	1330	1.0222	1630	1.0221
1040	1.0214	1340	1.0222	1640	1.0221
1050	1.0215	1350	1.0222	1650	1.0221
1060	1.0215	1360	1.0222	1660	1.0221
1070	1.0216	1370	1.0222	1670	1.0221
1080	1.0216	1380	1.0222	1680	1.0221
1090	1.0216	1390	1.0223	1690	1.0220
1100	1.0217	1400	1.0223	1700	1.0220
1110	1.0217	1410	1.0223	1710	1.0220
1120	1.0217	1420	1.0223	1720	1.0220
1130	1.0218	1430	1.0223	1730	1.0220
1140	1.0218	1440	1.0223	1740	1.0219
1150	1.0218	1450	1.0223	1750	1.0219
1160	1.0219	1460	1.0223	1760	1.0219
1170	1.0219	1470	1.0223	1770	1.0219
1180	1.0219	1480	1.0223	1780	1.0218
1190	1.0219	1490	1.0223	1790	1.0218
1200	1.0220	1500	1.0223	1800	1.0218

5. Power density

Table.6 shows region power in cases of BOC, MOC and EOC.

Table.6 Region powers (Watt)

	BOC	MOC	EOC
Core1	3.5223E+08	3.4656E+08	3.2807E+08
Core2	3.9707E+08	3.7831E+08	3.6879E+08
Core3	1.3826E+08	1.3187E+08	1.3337E+08
Lateral Blanket	5.3422E+06	1.3895E+07	2.2835E+07