Format of LBEC-M benchmark

In LBEC-M benchmark, Three different depletion problems are specified for the benchmark as follows:

Mode.1: Burn-up cycle consists of 1800 effective full-power days

Mode.2: Burn-up cycle consists of 900 effective full-power days

Mode.3: Fuel cycle consists of six partial fuel cycles of 300 effective full-power days each. Reactor is shut down for refuelling for 60 days. During refuelling, 1/6 mass part of fuel and fission products in core and blanket zones is removed and fresh fuel composition is added.

The requested functionals are as follows:

- For reactor depletion Modes 1 and 2;
  - k_{eff}
  - axial and radial power distributions in the core*
  - power peaking factors in the core zones
  - volume averaged neutron spectra in the core zones
  - k_{inf} in the core central zone.
- For depletion Mode 3:
  - k_{eff}
  - axial and radial power distributions in the core*
  - power peaking factors in the core zones
  - volume averaged neutron spectra in the core zones
  - k_{inf} in the core central zone

* Radial power distributions are to be calculated in two planes: in the core mid-plane and near the core top (45cm above the core mid-plane). Axial power distributions are to be calculated in the radial centre of each core zone.

In this format, you can use tables as follows;

- Table.1: BOC k_{eff} value from different codes
- Table.2 ~ 4: keff by time step, Region powers and power peaking factors, and Volume averaged neutron spectra in the core (Mode.1)
- Table.5 ~ 7: keff by time step, Region powers and power peaking factors, and Volume averaged neutron spectra in the core (Mode.2)
- Table.8 ~ 10: keff by time step, Region powers and power peaking factors, and Volume averaged neutron spectra in the core (Mode.3)

Please input number of energy group, using codes, using library and other data from the next page. If lines in table are not enough, please add lines you need. About Figure, please insert after tables in each mode. Thank you for your cooperation.

Number of energy group: 33 (ANL)
172(RRC KI)
21(Tokyo Tech)

Use codes:

- ANL
  - Cell Calc: MC^2-2.
  - Flux Calc: TWODANT, DIF3D
  - Fuel Cycle Analysis: REBUS-3
- RRC KI
  - Cell Calc:NJOY99 (ver.99.90)
  - Flux Calc:MCNP5 Monte Carlo code
  - Fuel Cycle Analysis:ISTAR-2
- Tokyo Tech
  - Cell Calc: SRAC
  - Flux Calc: Original
  - Fuel Cycle Analysis: Original
-
-

Use nuclear data set:

- ANL: ENDF/B-V.2
- RRC KI: ENDF/B-6, JEFF, JENDL3.2
- Tokyo Tech: JENDL3.3

BOC k_{eff}		
Organization	Codes	k_{eff} value
ANL	DIF3D	0.99715
	TWODANT	0.99851
	MCNP4C(.50c)	0.99761
RRC KI	MCNP5	1.0038±0.0003
	MCNP5(.50c)	0.99349
Tokyo Tech		1.00271

Table.1 BOC k_{eff} value from different codes

Mode.1

Table.2 k_{eff} by time step (Mode.1)

Mode.1				
k_{eff} for 900MW, 1800 Days Cycle				
day	Codes			
	ANL		RRC KI	Tokyo Tech
	DIF3D	TWODANT	MCNP5	
0	0.99715	0.99851	1.0038±0.0003	1.002710
200	1.00252	1.00385		1.003220
400	1.00730	1.00862		1.004182
600	1.01151	1.01284		1.004793
800	1.01517	1.01651		1.005053
1000	1.01829	1.01967		1.004972
1200	1.02093	1.02235		1.004569
1400	1.02311	1.02457		1.003866
1600	1.02487	1.02637		1.002889
1800	1.02624	1.02779	1.0102±0.0003	1.001663

Table.3 Region powers and power peaking factors (ANL)

Mode.1					
	ZONE	Power(Watts)	Power Density (Watts/cc)	Peak Density (Watts/cc)	Peak to AVG. Power Density
BOC	Core1	3.33E+08	1.43E+02	1.90E+02	1.33E+00
	Core2	3.97E+08	1.27E+02	1.95E+02	1.53E+00
	Core3	1.48E+08	1.00E+02	1.58E+02	1.58E+00
EOC	Core1	3.25E+08	1.39E+02	1.86E+02	1.34E+00
	Core2	3.68E+08	1.18E+02	1.78E+02	1.52E+00
	Core3	1.37E+08	9.27E+01	1.41E+02	1.52E+00

Table.3 Region powers and power peaking factors (Tokyo Tech)

Mode.1					
	ZONE	Power(Watts)	Power Density	Peak Density	Peak to AVG.
			(Watts/cc)	(Watts/cc)	Power Density
BOC	Core1	3.49E+08	1.54E+02	2.02E+02	1.31E+00
	Core2	3.99E+08	1.30E+02	1.96E+02	1.51E+00
	Core3	1.40E+08	9.51E+01	1.45E+02	1.53E+00
EOC	Core1	3.25E+08	1.43E+02	1.81E+02	1.26E+00
	Core2	3.75E+08	1.22E+02	1.77E+02	1.45E+00
	Core3	1.38E+08	9.36E+01	1.37E+02	1.47E+00

Table.4 Volume averaged neutron spectra in the core (ANL)

Mode.1						
	BOC			EOC		
Energy	Core.1	Core.2	Core.3	Core.1	Core.2	Core.3
1.41E+07	2.16E+11	1.88E+11	1.31E+11	2.06E+11	1.70E+11	1.20E+11
1.00E+07	3.82E+12	3.32E+12	2.28E+12	3.70E+12	3.04E+12	2.12E+12
6.07E+06	1.84E+13	1.59E+13	1.08E+13	1.79E+13	1.46E+13	1.00E+13
3.68E+06	5.01E+13	4.17E+13	2.71E+13	4.90E+13	3.85E+13	2.54E+13
2.23E+06	1.03E+14	8.22E+13	4.79E+13	1.02E+14	7.66E+13	4.53E+13
1.35E+06	1.72E+14	1.35E+14	7.96E+13	1.69E+14	1.25E+14	7.54E+13
8.21E+05	2.85E+14	2.20E+14	1.34E+14	2.76E+14	2.03E+14	1.27E+14
4.98E+05	3.45E+14	2.64E+14	1.61E+14	3.33E+14	2.44E+14	1.53E+14
3.02E+05	3.51E+14	2.66E+14	1.60E+14	3.39E+14	2.46E+14	1.52E+14
1.83E+05	3.15E+14	2.37E+14	1.39E+14	3.05E+14	2.20E+14	1.32E+14
1.11E+05	2.58E+14	1.94E+14	1.10E+14	2.48E+14	1.79E+14	1.04E+14
6.74E+04	2.54E+14	1.87E+14	1.08E+14	2.42E+14	1.73E+14	1.02E+14
4.09E+04	1.56E+14	1.14E+14	5.94E+13	1.48E+14	1.05E+14	5.58E+13
2.48E+04	1.87E+14	1.33E+14	7.23E+13	1.78E+14	1.23E+14	6.78E+13
1.50E+04	1.12E+14	7.72E+13	3.49E+13	1.07E+14	7.14E+13	3.27E+13
9.12E+03	6.12E+13	4.08E+13	1.60E+13	5.81E+13	3.77E+13	1.50E+13
5.53E+03	5.04E+13	3.27E+13	1.32E+13	4.77E+13	3.02E+13	1.23E+13
3.36E+03	2.92E+13	1.83E+13	6.71E+12	2.74E+13	1.68E+13	6.17E+12
2.04E+03	1.60E+13	9.60E+12	3.44E+12	1.49E+13	8.76E+12	3.10E+12
1.23E+03	6.67E+12	3.86E+12	1.29E+12	6.14E+12	3.49E+12	1.14E+12
7.49E+02	3.24E+12	1.86E+12	6.65E+11	2.85E+12	1.62E+12	5.48E+11
4.54E+02	9.22E+11	5.15E+11	2.08E+11	7.82E+11	4.37E+11	1.63E+11
3.04E+02	5.47E+11	2.99E+11	1.68E+11	4.09E+11	2.28E+11	1.11E+11
1.49E+02	8.03E+10	4.33E+10	4.29E+10	4.76E+10	2.72E+10	2.37E+10
9.17E+01	1.90E+10	1.05E+10	1.48E+10	7.85E+09	4.82E+09	6.06E+09
6.79E+01	1.39E+10	7.98E+09	1.47E+10	3.74E+09	2.54E+09	4.46E+09
4.02E+01	4.85E+09	2.88E+09	5.78E+09	1.36E+09	9.67E+08	1.85E+09
2.26E+01	8.80E+08	5.22E+08	7.10E+08	2.65E+08	1.85E+08	2.32E+08
1.37E+01	7.75E+08	4.54E+08	6.92E+08	6.79E+07	5.36E+07	7.06E+07
8.32E+00	1.87E+08	1.09E+08	1.36E+08	2.40E+07	1.79E+07	1.72E+07
3.99E+00	8.70E+08	5.79E+08	1.42E+09	2.36E+07	3.90E+07	1.61E+08
5.41E-01	4.55E+07	2.84E+07	6.20E+07	1.30E+06	1.40E+06	3.94E+06
4.14E-01	7.12E+07	4.26E+07	5.60E+07	3.53E+05	3.54E+05	6.45E+05

Table.5 Volume averaged neutron spectra in the core (Tokyo Tech)

Mode.1						
	BOC			EOC		
Energy	Core.1	Core.2	Core.3	Core.1	Core.2	Core.3
1.00E+07	2.86E+12	2.35E+12	1.47E+12	2.80E+12	2.29E+12	1.50E+12
6.07E+06	7.91E+12	6.51E+12	4.07E+12	7.65E+12	6.30E+12	4.14E+12
3.68E+06	1.41E+13	1.11E+13	6.54E+12	1.37E+13	1.08E+13	6.67E+12
2.23E+06	2.14E+13	1.63E+13	8.92E+12	2.10E+13	1.60E+13	9.19E+12
1.35E+06	2.84E+13	2.09E+13	1.09E+13	2.76E+13	2.04E+13	1.13E+13
8.21E+05	6.81E+13	4.90E+13	2.57E+13	6.49E+13	4.71E+13	2.61E+13
3.88E+05	6.50E+13	4.66E+13	2.48E+13	6.20E+13	4.49E+13	2.53E+13
1.83E+05	5.64E+13	4.01E+13	2.16E+13	5.35E+13	3.85E+13	2.19E+13
8.65E+04	3.59E+13	2.54E+13	1.40E+13	3.37E+13	2.42E+13	1.41E+13
4.09E+04	2.78E+13	1.93E+13	1.08E+13	2.58E+13	1.83E+13	1.07E+13
1.93E+04	1.15E+13	7.89E+12	4.48E+12	1.06E+13	7.45E+12	4.44E+12
9.12E+03	4.66E+12	3.16E+12	1.80E+12	4.23E+12	2.95E+12	1.77E+12
4.31E+03	5.91E+12	3.88E+12	2.18E+12	5.13E+12	3.49E+12	2.08E+12
2.03E+03	2.36E+12	1.51E+12	8.84E+11	1.92E+12	1.29E+12	8.02E+11
9.61E+02	6.64E+11	4.13E+11	2.61E+11	4.91E+11	3.27E+11	2.21E+11
4.54E+02	1.42E+11	8.77E+10	6.39E+10	8.69E+10	5.94E+10	4.74E+10
2.14E+02	2.91E+10	1.83E+10	1.55E+10	1.42E+10	1.03E+10	9.80E+09
1.01E+02	9.59E+09	6.39E+09	5.85E+09	2.43E+09	2.06E+09	2.35E+09
2.38E+00	2.25E+06	1.49E+06	1.61E+06	6.14E+04	9.07E+04	1.98E+05
4.14E-01	9.07E+04	6.74E+04	6.70E+04	1.17E+02	2.27E+02	6.14E+02
6.40E-02	1.89E+03	1.40E+03	1.38E+03	3.55E-01	9.62E-01	3.12E+00
1.00E-05	1.89E+03	1.40E+03	1.38E+03	3.55E-01	9.62E-01	3.12E+00

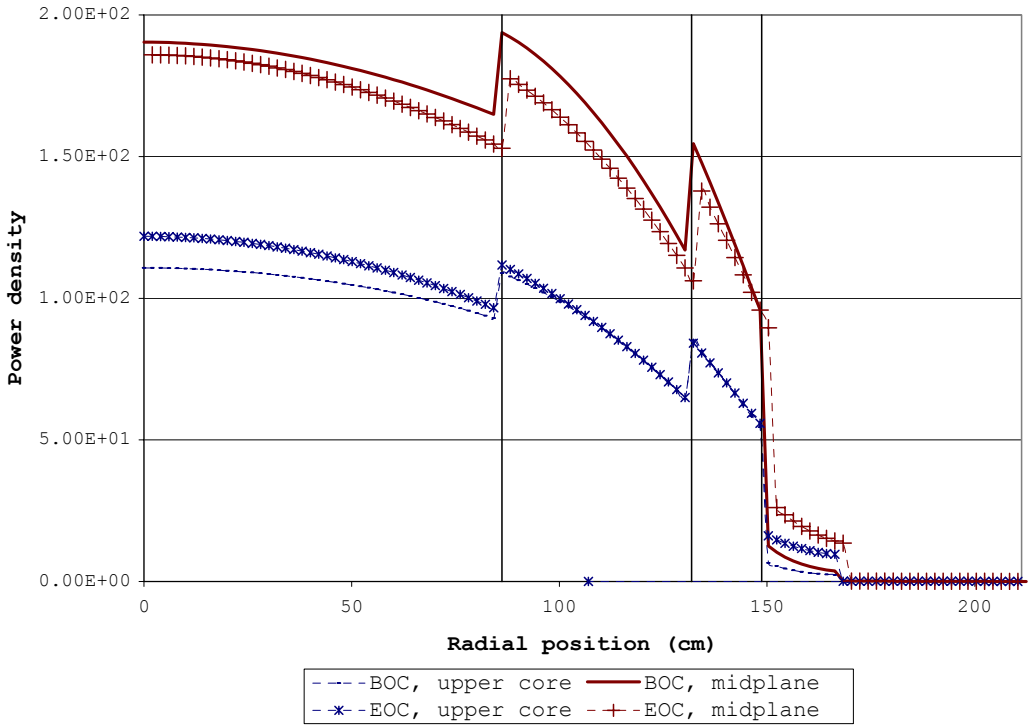
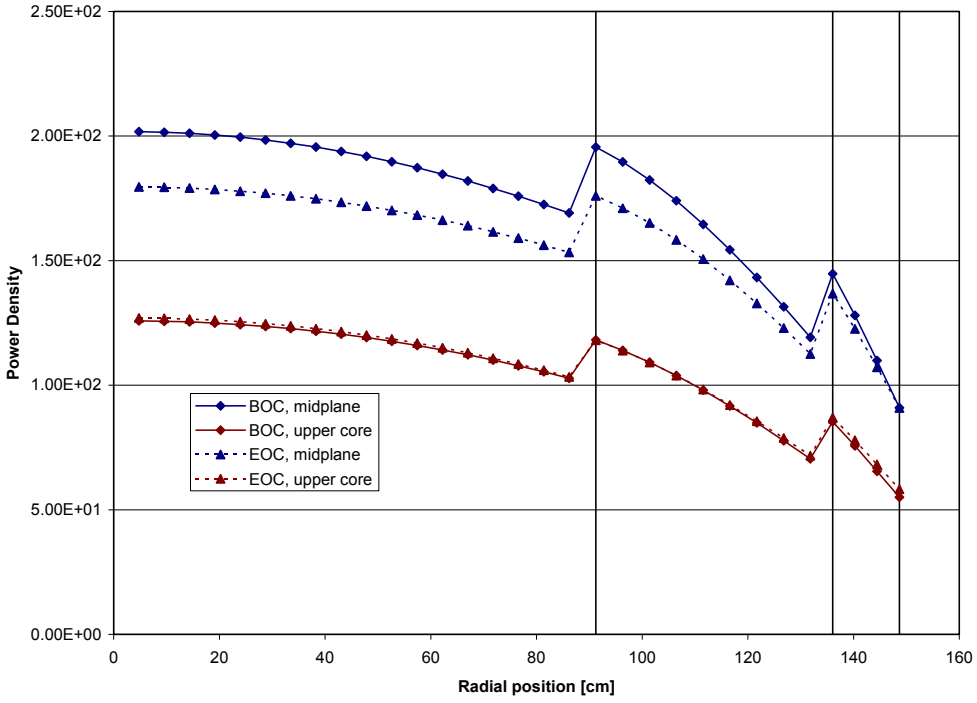


Fig.1 Radial power profiles in the core(ANL)



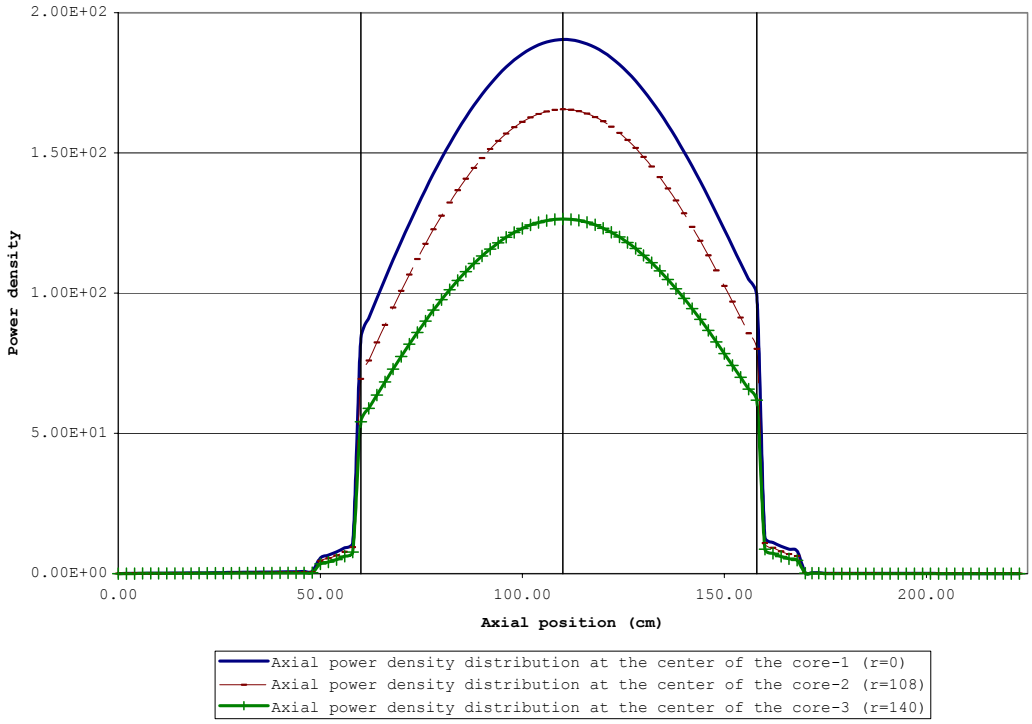


Fig.2 Axial power profiles in the core at the beginning of cycle(ANL)

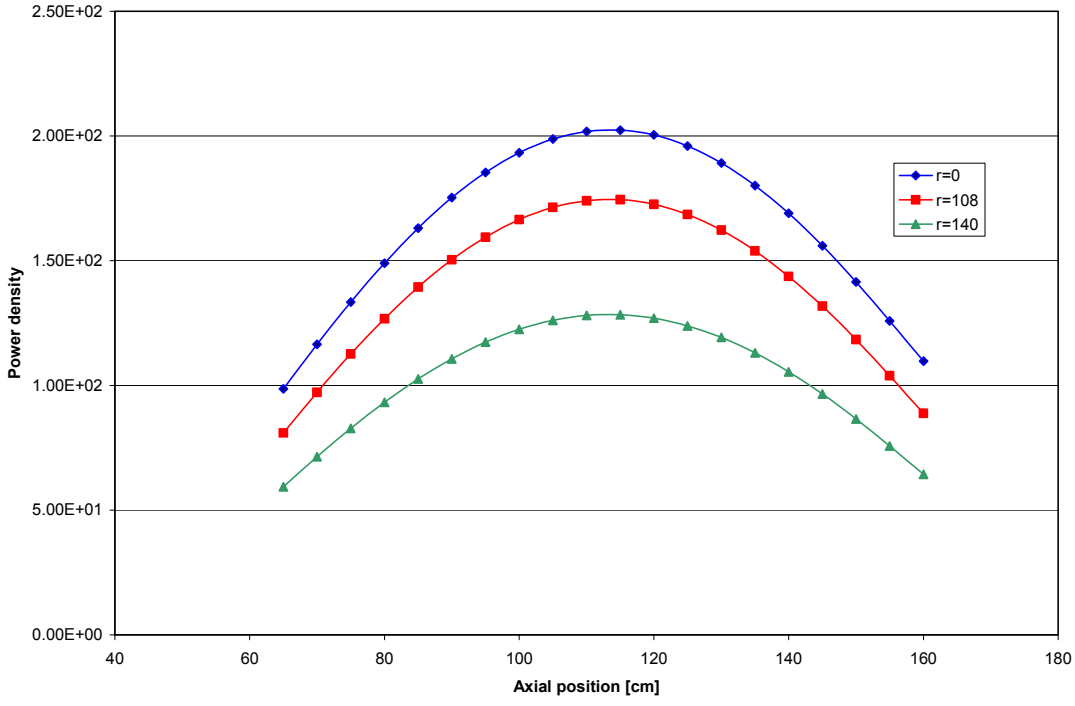


Fig.3 Axial power profiles in the core at the beginning of cycle(Tokyo Tech)

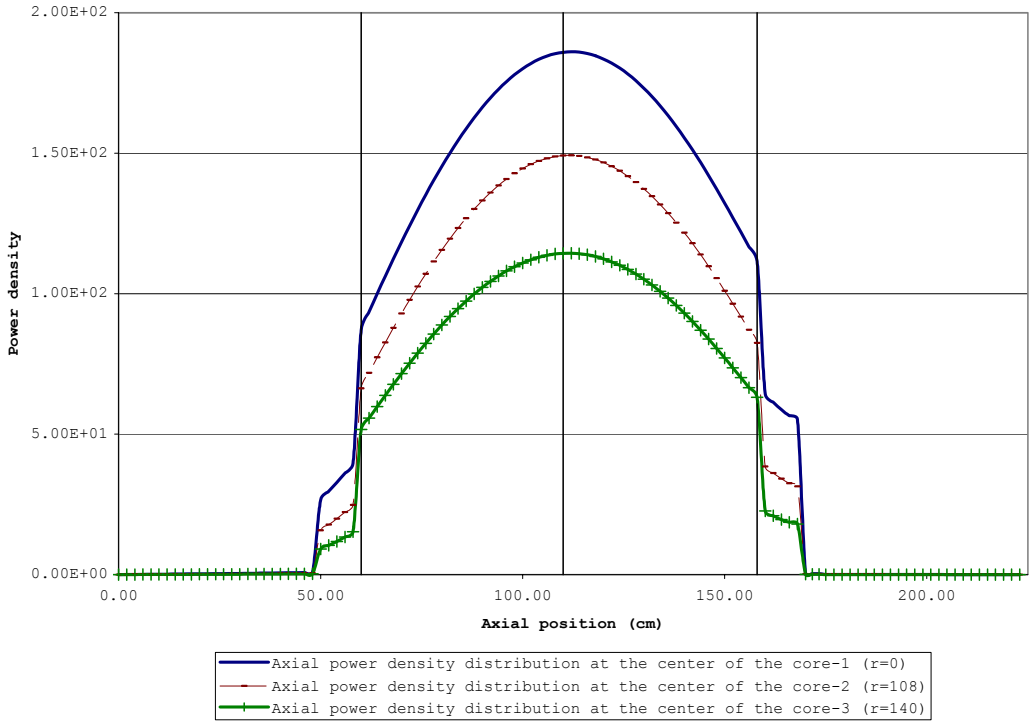


Fig.3 Axial power profiles in the core at the end of cycle(ANL)

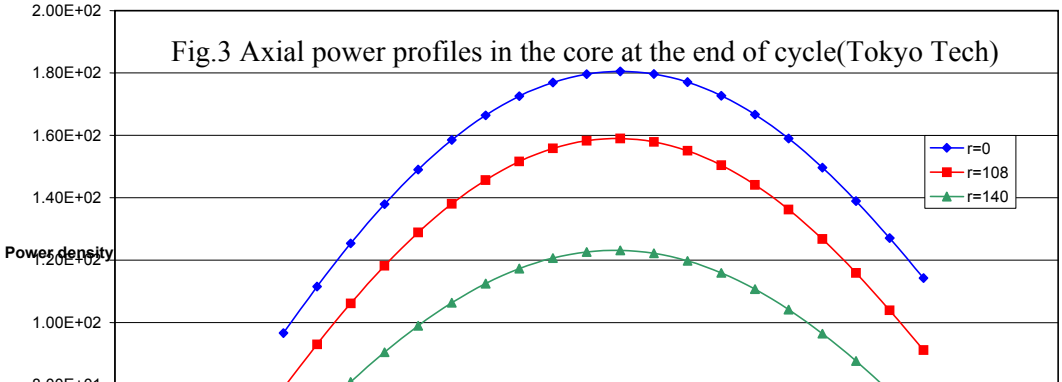


Table. Neutron spectra in RBEC-M cores at the beginning of the cycle(ANL)

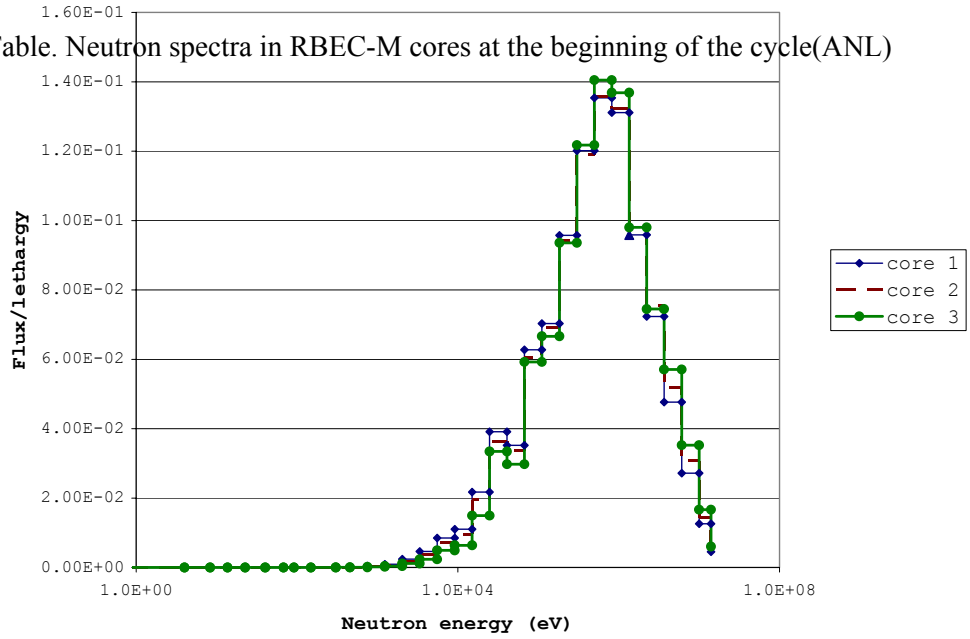
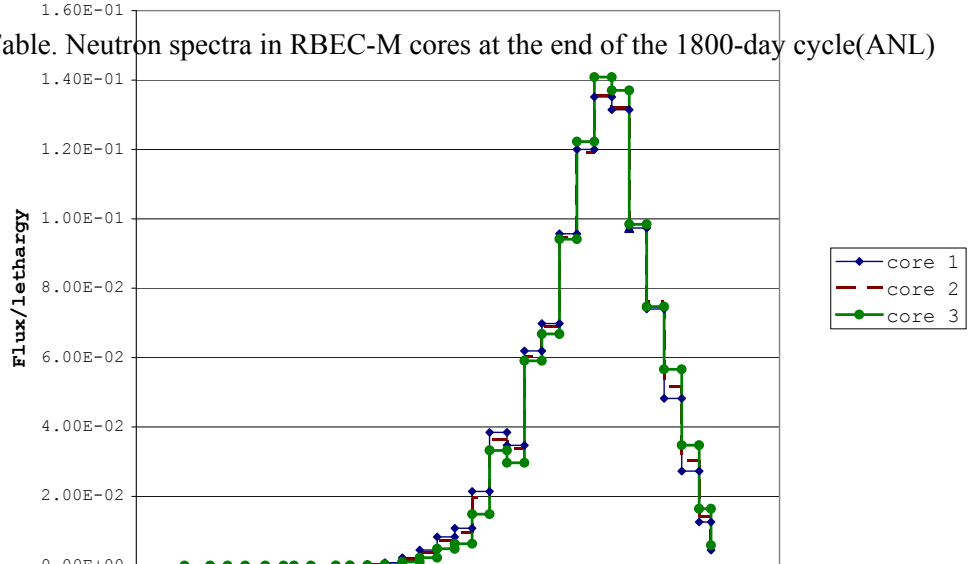


Table. Neutron spectra in RBEC-M cores at the end of the 1800-day cycle(ANL)



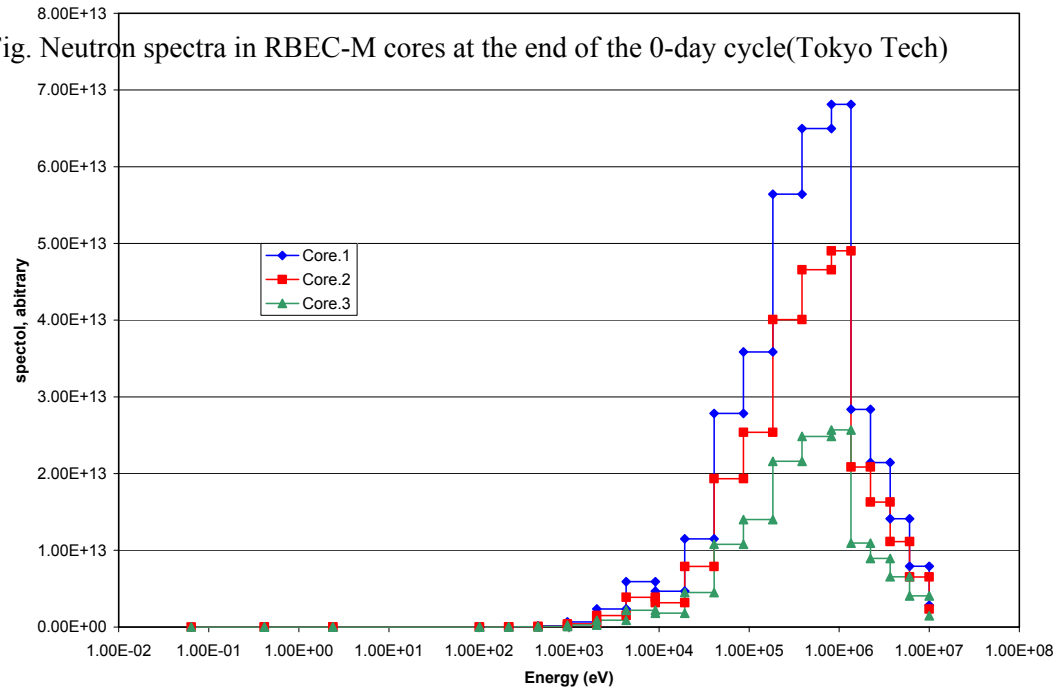


Fig. Neutron spectra in RBEC-M cores at the end of the 0-day cycle(Tokyo Tech)

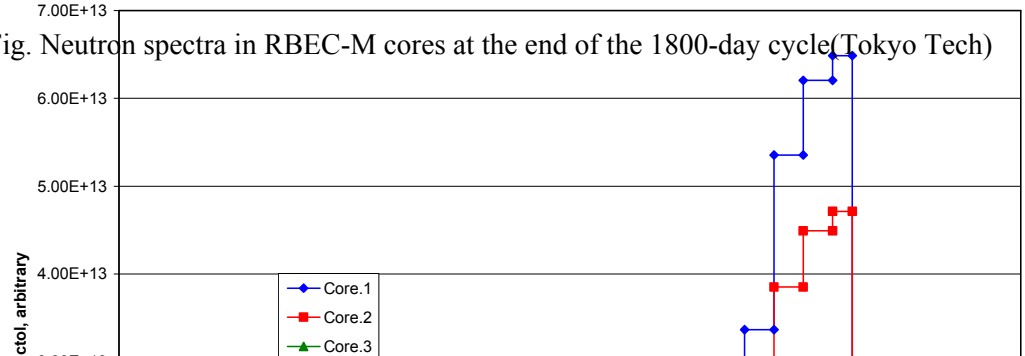


Fig. Neutron spectra in RBEC-M cores at the end of the 1800-day cycle(Tokyo Tech)

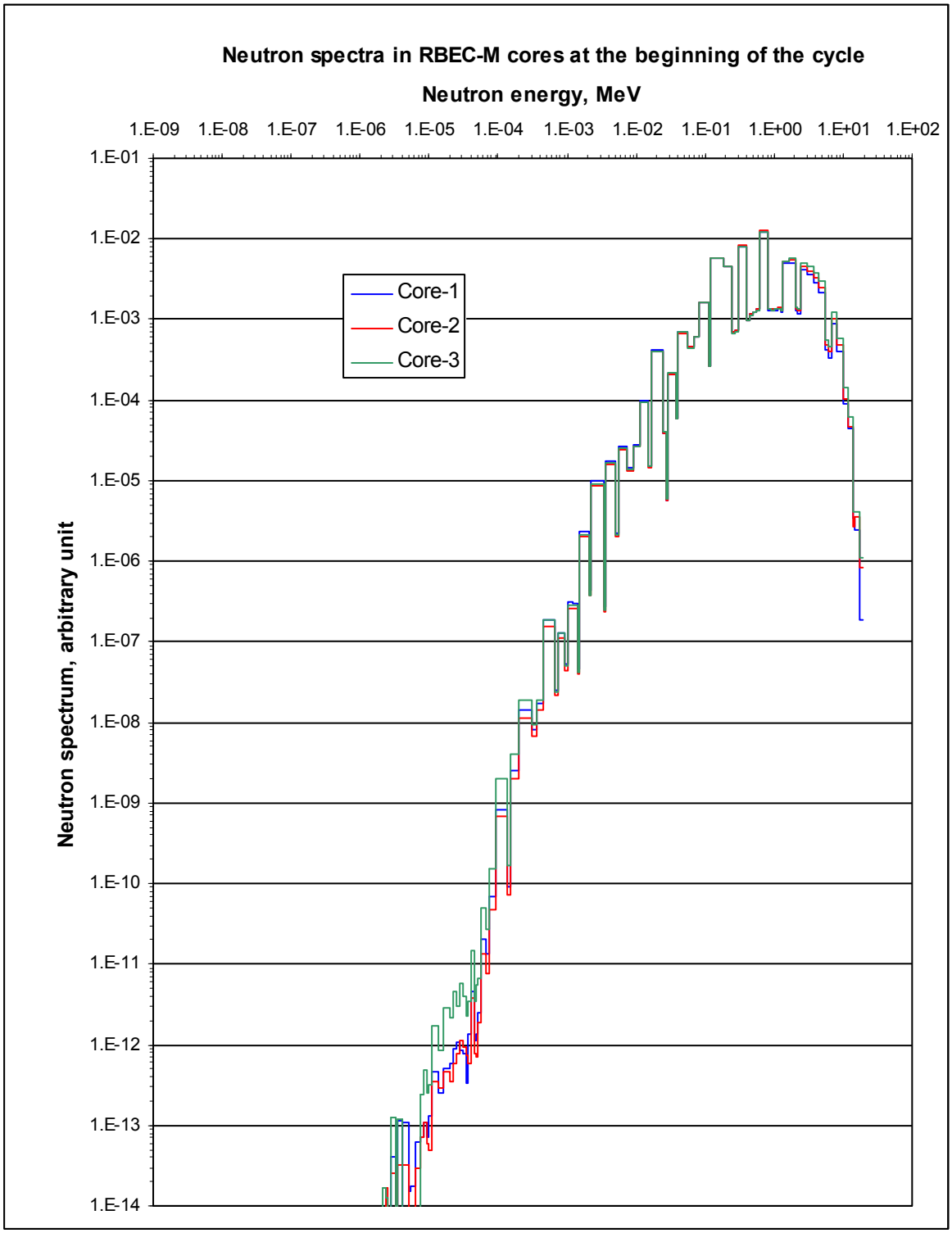


Table. Neutron spectra in RBEC-M cores at the beginning of the cycle(RRC KI)

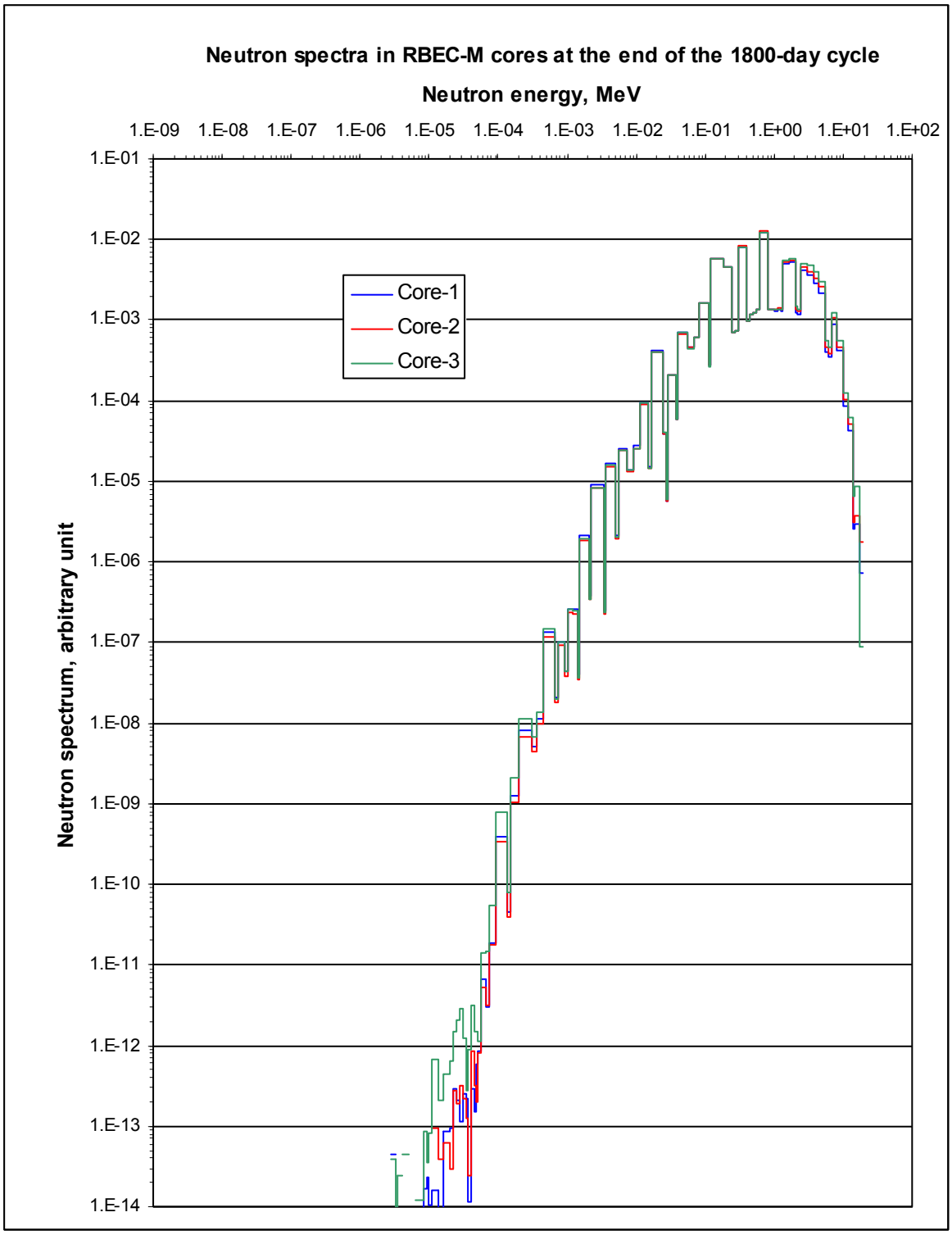


Figure 3. Neutron spectra in RBEC-M cores at the end of the 1800-day cycle(RRC KI)

Mode.2

Table.5 k_{eff} by time step (ANL)

Mode.2				
keff for 900MW, 900 Days Cycle				
day	Codes			
	ANL		RRC KI	Tokyo Tech
	DIF3D	TWODANT	MCNP5	
0	0.99715	0.99851	1.0038±0.0003	1.00271
100	0.99991	1.00125		1.002611
200	1.00252	1.00385		1.00322
300	1.00498	1.0063		1.003744
400	1.0073	1.00862		1.004182
500	1.00948	1.0108		1.004532
600	1.01151	1.01284		1.004793
700	1.0134	1.01474		1.004967
800	1.01516	1.01651		1.005053
900	1.01679	1.01815	1.0122±0.0003	1.005054

Table.6 Region powers and power peaking factors (ANL)

Mode.2					
	ZONE	Power(Watts)	Power Density (Watts/cc)	Peak Density (Watts/cc)	Peak to AVG. Power Density
BOC	Core1	3.33E+08	1.43E+02	1.90E+02	1.33E+00
	Core2	3.97E+08	1.27E+02	1.94E+02	1.53E+00
	Core3	1.48E+08	1.00E+02	1.58E+02	1.58E+00
EOC	Core1	3.35E+08	1.44E+02	1.94E+02	1.35E+00
	Core2	3.78E+08	1.21E+02	1.86E+02	1.54E+00
	Core3	1.39E+08	9.40E+01	1.45E+02	1.55E+00

Table.6 Region powers and power peaking factors (Tokyo Tech)

Mode.2					
	ZONE	Power(Watts)	Power Density (Watts/cc)	Peak Density (Watts/cc)	Peak to AVG. Power Density
BOC	Core1	3.49E+08	1.54E+02	2.02E+02	1.31E+00
	Core2	3.99E+08	1.30E+02	1.96E+02	1.51E+00
	Core3	1.40E+08	9.51E+01	1.45E+02	1.53E+00
EOC	Core1	3.42E+08	1.52E+02	1.98E+02	1.30E+00
	Core2	3.83E+08	1.25E+02	1.87E+02	1.50E+00
	Core3	1.36E+08	9.22E+01	1.38E+02	1.50E+00

Table.7 Volume averaged neutron spectra in the core (ANL)

Mode.2						
day	BOC			EOC		
Energy	Core.1	Core.2	Core.3	Core.1	Core.2	Core.3
1.41E+07	2.1584E+11	1.88E+11	1.31E+11	2.13E+11	1.75E+11	1.22E+11
1.00E+07	3.8242E+12	3.32E+12	2.28E+12	3.81E+12	3.13E+12	2.14E+12
6.07E+06	1.8403E+13	1.59E+13	1.08E+13	1.84E+13	1.50E+13	1.01E+13
3.68E+06	5.0082E+13	4.17E+13	2.71E+13	5.03E+13	3.95E+13	2.55E+13
2.23E+06	1.0302E+14	8.22E+13	4.79E+13	1.04E+14	7.82E+13	4.53E+13
1.35E+06	1.7237E+14	1.35E+14	7.96E+13	1.73E+14	1.28E+14	7.54E+13
8.21E+05	2.8480E+14	2.20E+14	1.34E+14	2.84E+14	2.08E+14	1.27E+14
4.98E+05	3.4453E+14	2.64E+14	1.61E+14	3.42E+14	2.50E+14	1.53E+14
3.02E+05	3.5078E+14	2.66E+14	1.60E+14	3.48E+14	2.52E+14	1.53E+14
1.83E+05	3.1530E+14	2.37E+14	1.39E+14	3.13E+14	2.26E+14	1.32E+14
1.11E+05	2.5780E+14	1.94E+14	1.10E+14	2.55E+14	1.84E+14	1.05E+14
6.74E+04	2.5359E+14	1.87E+14	1.08E+14	2.49E+14	1.77E+14	1.02E+14
4.09E+04	1.5551E+14	1.14E+14	5.94E+13	1.53E+14	1.08E+14	5.63E+13
2.48E+04	1.8729E+14	1.33E+14	7.23E+13	1.83E+14	1.26E+14	6.85E+13
1.50E+04	1.1231E+14	7.72E+13	3.49E+13	1.10E+14	7.32E+13	3.31E+13
9.12E+03	6.1175E+13	4.08E+13	1.60E+13	5.98E+13	3.87E+13	1.52E+13
5.53E+03	5.0412E+13	3.27E+13	1.32E+13	4.91E+13	3.10E+13	1.25E+13
3.36E+03	2.9159E+13	1.83E+13	6.71E+12	2.83E+13	1.73E+13	6.30E+12
2.04E+03	1.6014E+13	9.60E+12	3.44E+12	1.54E+13	9.03E+12	3.19E+12
1.23E+03	6.6742E+12	3.86E+12	1.29E+12	6.37E+12	3.61E+12	1.18E+12
7.49E+02	3.2363E+12	1.86E+12	6.65E+11	3.01E+12	1.70E+12	5.88E+11
4.54E+02	9.2239E+11	5.15E+11	2.08E+11	8.38E+11	4.65E+11	1.79E+11
3.04E+02	5.4687E+11	2.99E+11	1.68E+11	4.60E+11	2.54E+11	1.31E+11
1.49E+02	8.0318E+10	4.33E+10	4.29E+10	5.87E+10	3.28E+10	3.05E+10
9.17E+01	1.9035E+10	1.05E+10	1.48E+10	1.10E+10	6.56E+09	8.83E+09
6.79E+01	1.3949E+10	7.98E+09	1.47E+10	6.15E+09	4.00E+09	7.38E+09
4.02E+01	4.8520E+09	2.88E+09	5.78E+09	2.23E+09	1.50E+09	2.99E+09
2.26E+01	8.7954E+08	5.22E+08	7.10E+08	4.16E+08	2.78E+08	3.70E+08
1.37E+01	7.7468E+08	4.54E+08	6.92E+08	1.52E+08	1.15E+08	1.72E+08
8.32E+00	1.8664E+08	1.09E+08	1.36E+08	4.58E+07	3.29E+07	3.72E+07
3.99E+00	8.7011E+08	5.79E+08	1.42E+09	1.53E+08	1.69E+08	5.50E+08
5.41E-01	4.5486E+07	2.84E+07	6.20E+07	5.73E+06	5.48E+06	1.53E+07
4.14E-01	7.1190E+07	4.26E+07	5.60E+07	1.73E+06	1.80E+06	3.66E+06

Table. Volume averaged neutron spectra in the core (Tokyo Tech)

Mode.2						
	BOC			EOC		
Energy	Core.1	Core.2	Core.3	Core.1	Core.2	Core.3
1.00E+07	2.86E+12	2.35E+12	1.47E+12	2.87E+12	2.30E+12	1.45E+12
6.07E+06	7.91E+12	6.51E+12	4.07E+12	7.90E+12	6.34E+12	4.00E+12
3.68E+06	1.41E+13	1.11E+13	6.54E+12	1.41E+13	1.09E+13	6.45E+12
2.23E+06	2.14E+13	1.63E+13	8.92E+12	2.15E+13	1.60E+13	8.84E+12
1.35E+06	2.84E+13	2.09E+13	1.09E+13	2.84E+13	2.04E+13	1.09E+13
8.21E+05	6.81E+13	4.90E+13	2.57E+13	6.72E+13	4.76E+13	2.54E+13
3.88E+05	6.50E+13	4.66E+13	2.48E+13	6.42E+13	4.53E+13	2.45E+13
1.83E+05	5.64E+13	4.01E+13	2.16E+13	5.55E+13	3.89E+13	2.13E+13
8.65E+04	3.59E+13	2.54E+13	1.40E+13	3.50E+13	2.45E+13	1.38E+13
4.09E+04	2.78E+13	1.93E+13	1.08E+13	2.70E+13	1.86E+13	1.05E+13
1.93E+04	1.15E+13	7.89E+12	4.48E+12	1.11E+13	7.59E+12	4.38E+12
9.12E+03	4.66E+12	3.16E+12	1.80E+12	4.46E+12	3.02E+12	1.75E+12
4.31E+03	5.91E+12	3.88E+12	2.18E+12	5.51E+12	3.63E+12	2.09E+12
2.03E+03	2.36E+12	1.51E+12	8.84E+11	2.12E+12	1.37E+12	8.25E+11
9.61E+02	6.64E+11	4.13E+11	2.61E+11	5.64E+11	3.61E+11	2.35E+11
4.54E+02	1.42E+11	8.77E+10	6.39E+10	1.08E+11	7.03E+10	5.37E+10
2.14E+02	2.91E+10	1.83E+10	1.55E+10	1.93E+10	1.32E+10	1.20E+10
1.01E+02	9.59E+09	6.39E+09	5.85E+09	4.16E+09	3.27E+09	3.48E+09
2.38E+00	2.25E+06	1.49E+06	1.61E+06	2.72E+05	3.17E+05	5.39E+05
4.14E-01	9.07E+04	6.74E+04	6.70E+04	8.54E+02	1.35E+03	2.86E+03
6.40E-02	1.89E+03	1.40E+03	1.38E+03	4.28E+00	9.02E+00	2.34E+01

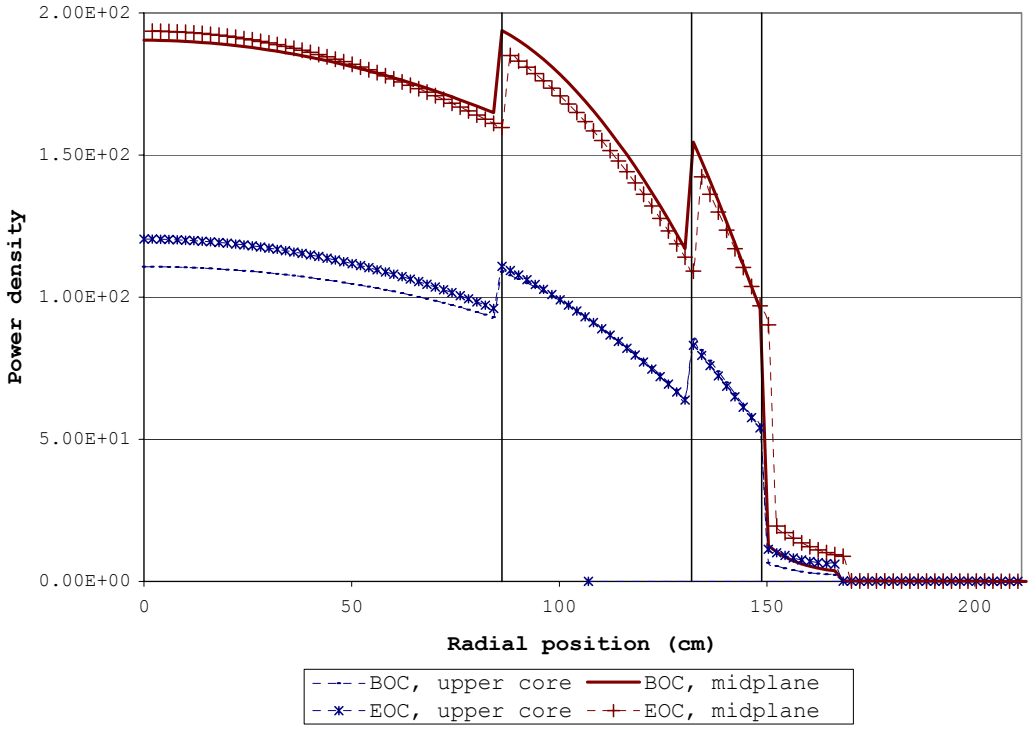


Fig.4 Radial power profiles in the core (ANL)

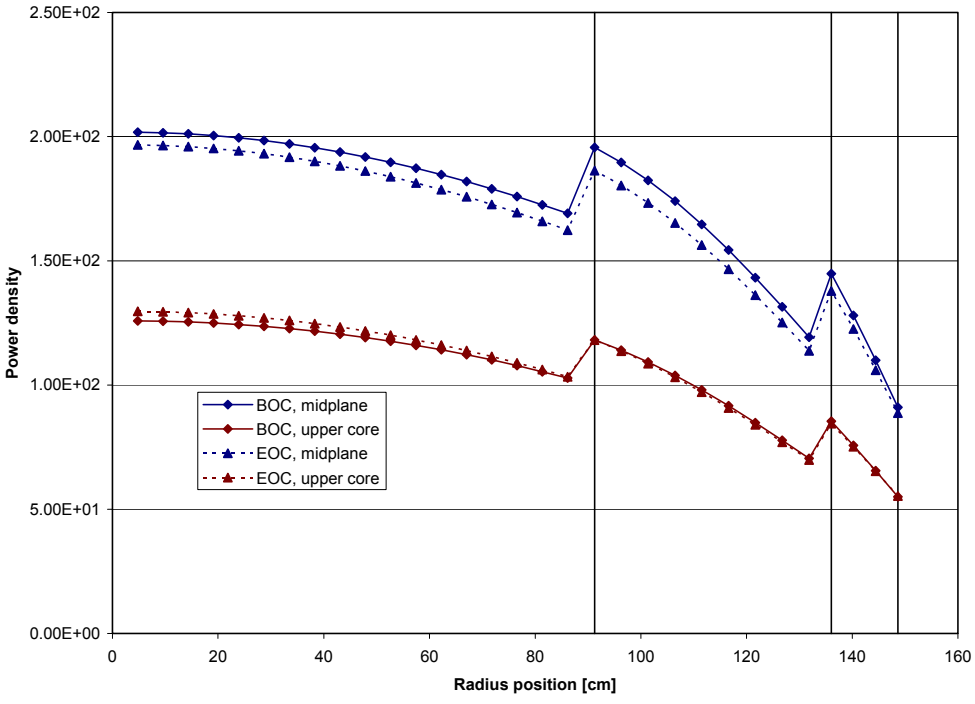


Fig.4 Radial power profiles in the core (Tokyo Tech)

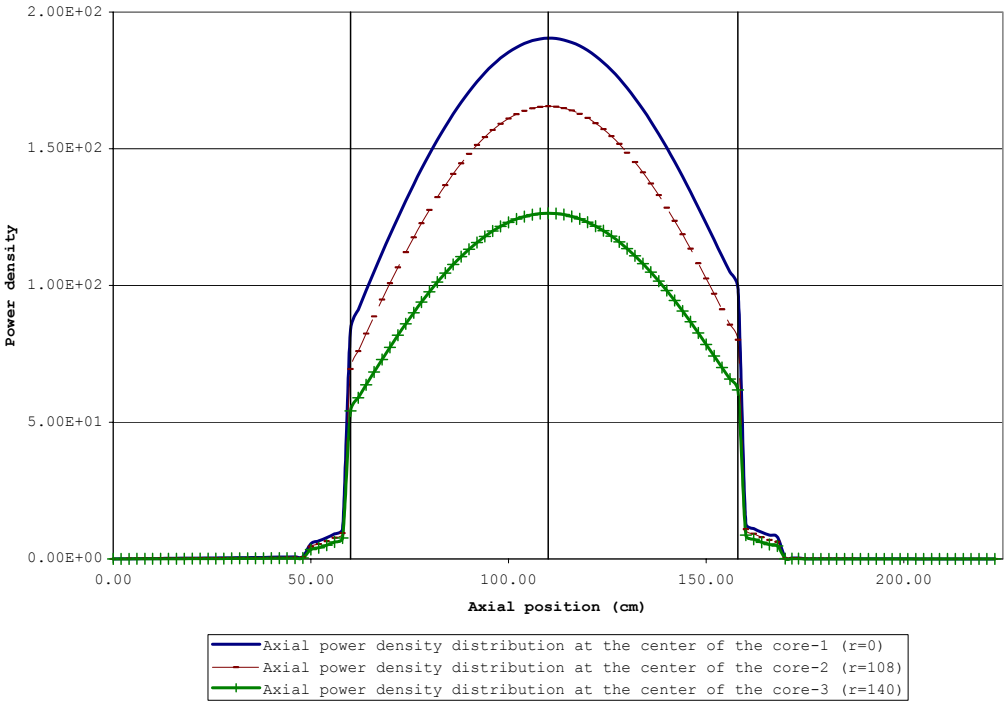


Fig.5 Axial power profiles in the core at the beginning of cycle (ANL)

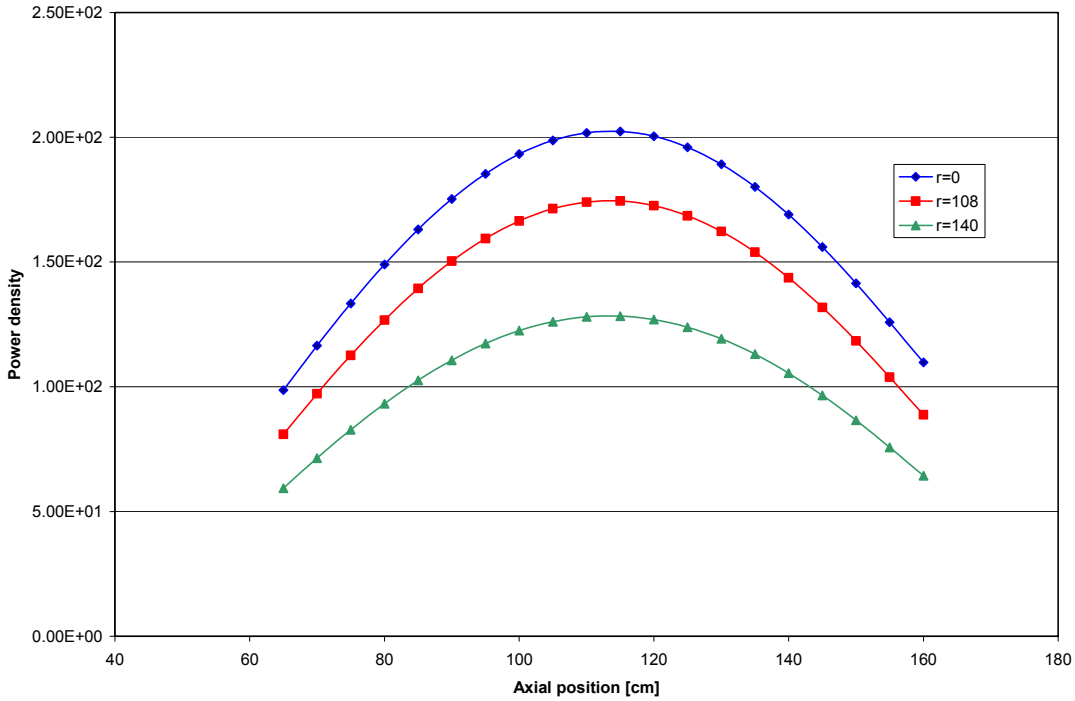


Fig.5 Axial power profiles in the core at the beginning of cycle (Tokyo Tech)

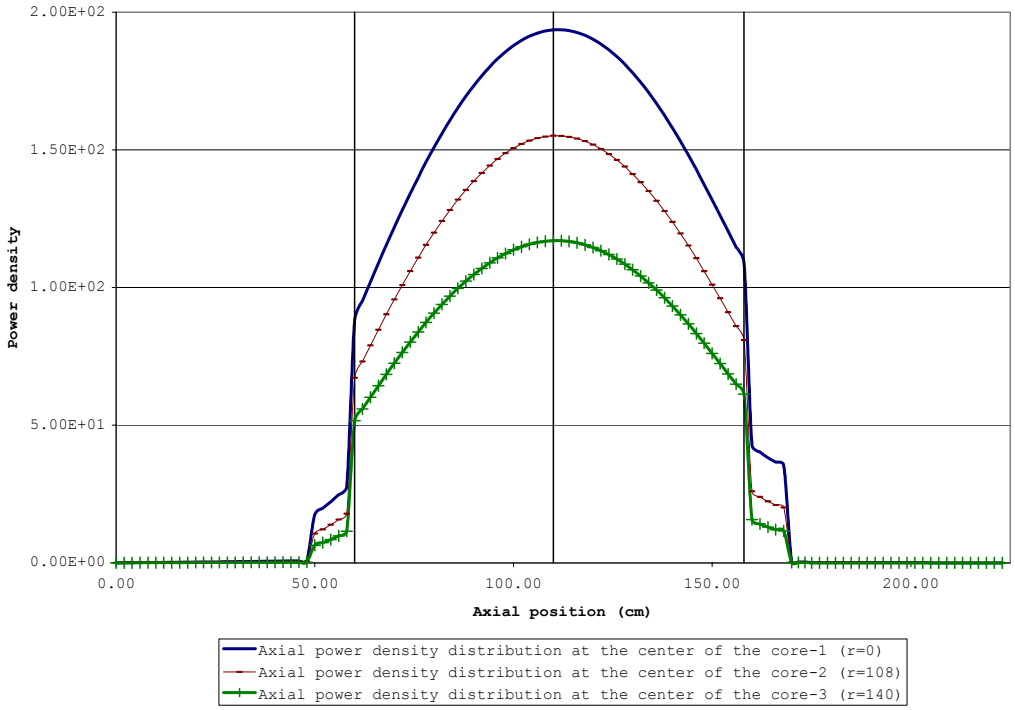


Fig.6 Axial power profiles in the core at the end of cycle (ANL)

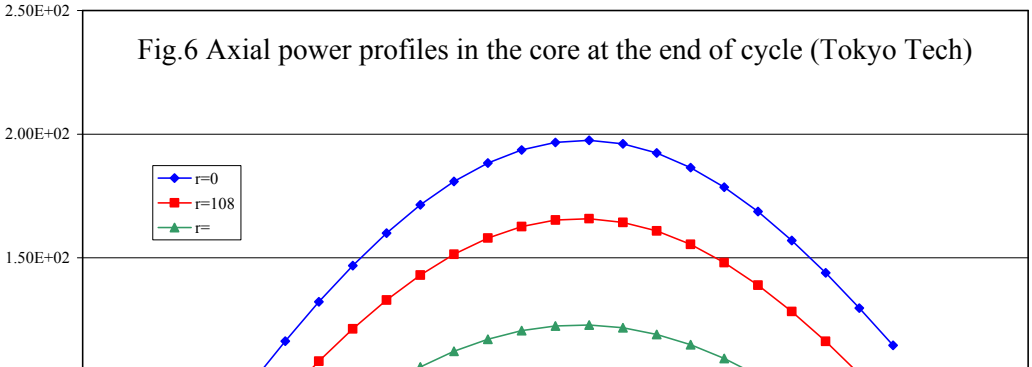


Table. Flux/Lethargy vs. Neutron Energy at the Beginning of Cycle(ANL)

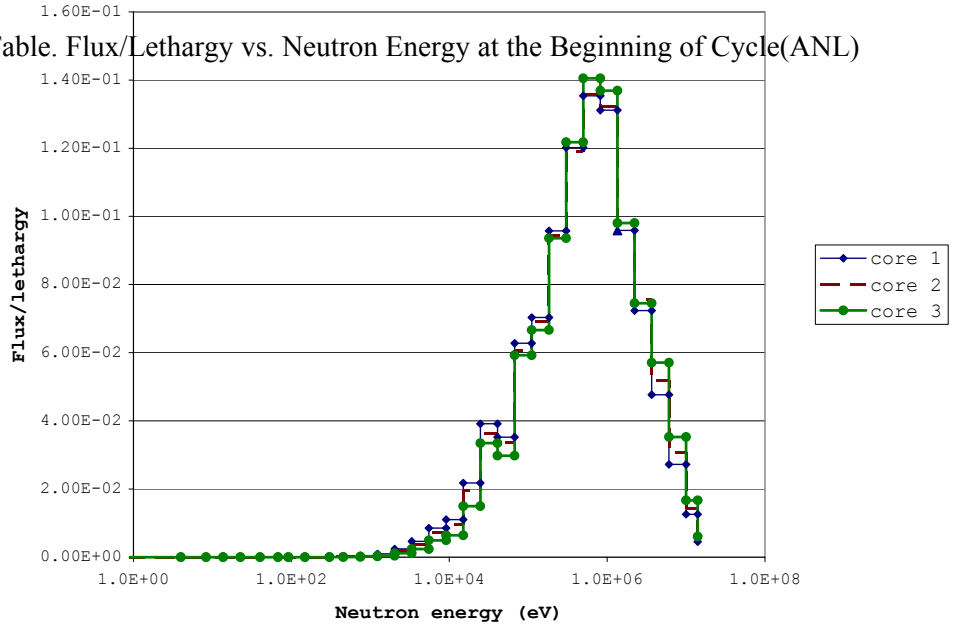


Table. **Flux**/Lethargy vs. Neutron Energy at the End of Cycle(ANL)

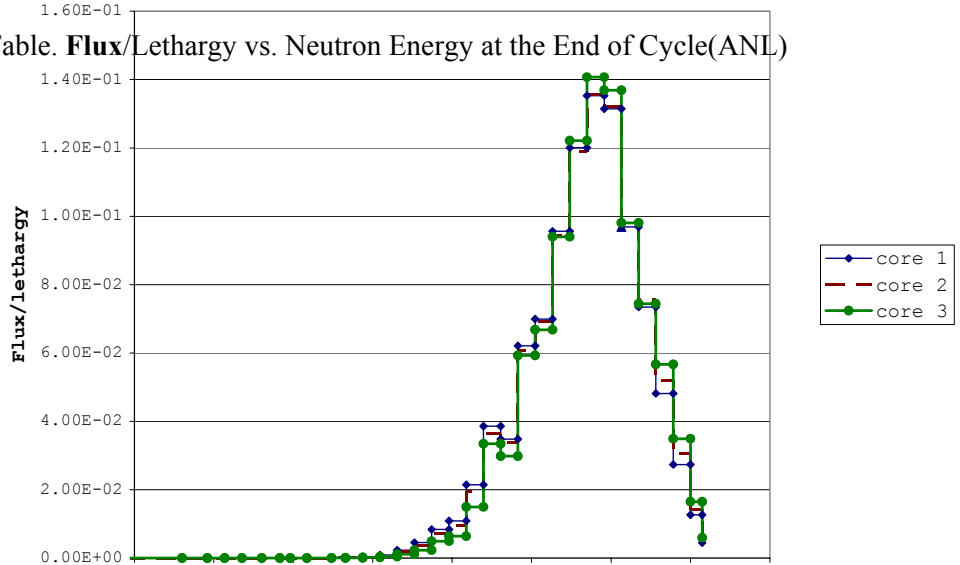


Table. Neutron spectra in RBEC-M cores at the end of the 0-day cycle(Tokyo Tech)

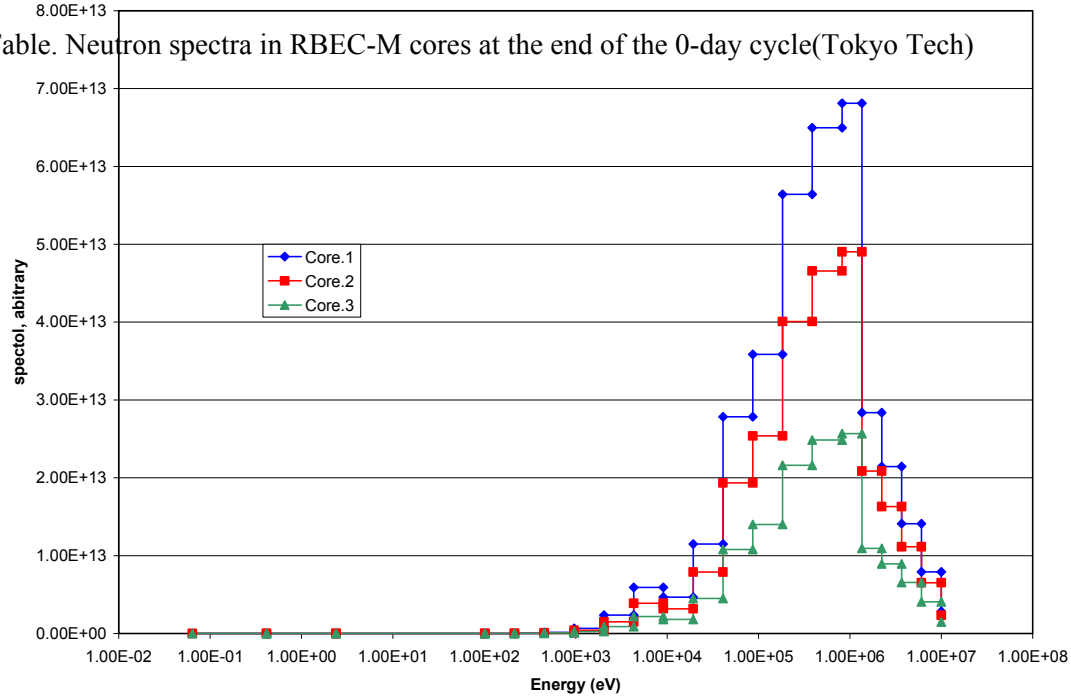
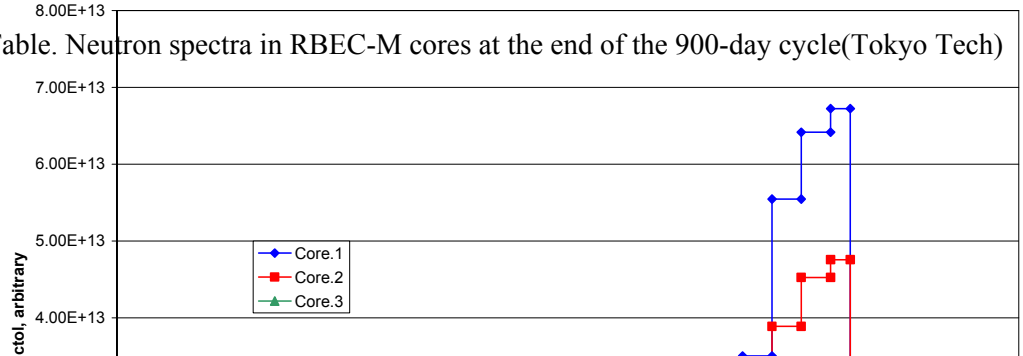


Table. Neutron spectra in RBEC-M cores at the end of the 900-day cycle(Tokyo Tech)



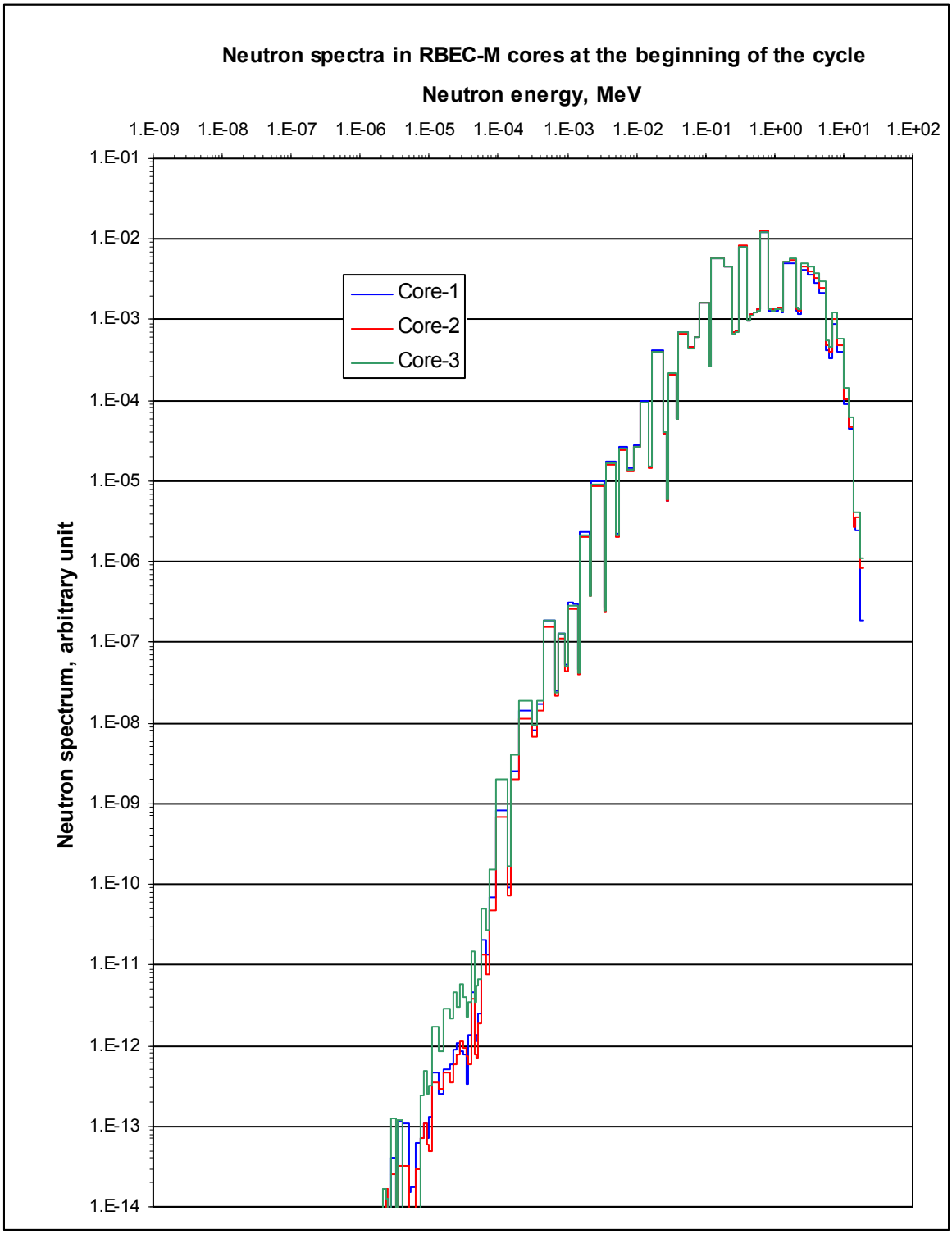


Table. Neutron spectra in RBEC-M cores at the beginning of the cycle(RRC KI)

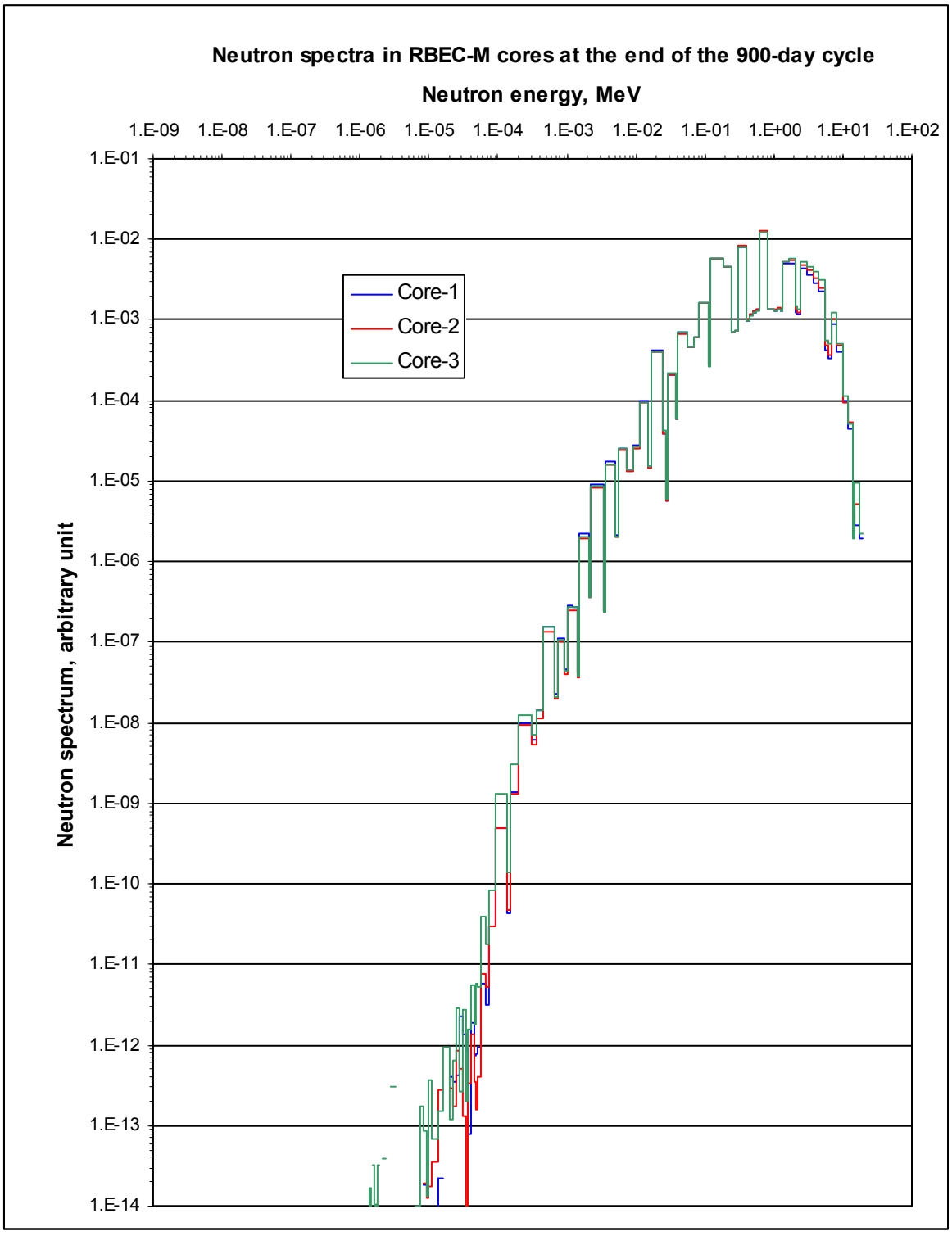


Table. Neutron spectra in RBEC-M cores at the end of the 900-day cycle(RRC KI)

Mode.3

Table.8 k_{eff} by time step (Mode.3)

Mode.3				
k_{eff} Evolution for 900MW, 6 Cycle				
day	Codes			
	ANL		RRC KI	Tokyo Tech
	DIF3D	TWODANT		
0	0.99715	0.99851		1.00271
300	1.00499	1.00631		1.003744
360	1.00317	1.00449		1.003641
660	1.01002	1.01134		1.004068
720	1.0074	1.00872		1.00392
1020	1.01344	1.01478		1.003912
1080	1.01027	1.0116		1.003778
1380	1.01567	1.01704		1.003401
1440	1.01213	1.01349		1.003329
1740	1.01705	1.01844		1.002658
1800	1.01328	1.01466		1.002682
2100	1.01783	1.01925		1.00179

Table.10 Region powers and power peaking factors (ANL)

Mode.3					
Time Days	ZONE	Power(Watts)	Power Density (Watts/cc)	Peak Density (Watts/cc)	Peak to AVG. Power Density
0	Core.1	3.3288E+08	1.4272E+02	1.9044E+02	1.3344E+00
	Core.2	3.9721E+08	1.2698E+02	1.9453E+02	1.5319E+00
	Core.3	1.4840E+08	1.0015E+02	1.5790E+02	1.5766E+00
300	Core.1	3.3527E+08	1.4375E+02	1.9304E+02	1.3429E+00
	Core.2	3.8948E+08	1.2451E+02	1.9151E+02	1.5381E+00
	Core.3	1.4427E+08	9.7368E+01	1.5255E+02	1.5668E+00
360	Core.1	3.3486E+08	1.4357E+02	1.9260E+02	1.3415E+00
	Core.2	3.9075E+08	1.2492E+02	1.9201E+02	1.5371E+00
	Core.3	1.4496E+08	9.7831E+01	1.5344E+02	1.5684E+00
660	Core.1	3.3583E+08	1.4399E+02	1.9390E+02	1.3466E+00
	Core.2	3.8417E+08	1.2281E+02	1.8914E+02	1.5401E+00
	Core.3	1.4173E+08	9.5651E+01	1.4909E+02	1.5586E+00
720	Core.1	3.3536E+08	1.4379E+02	1.9335E+02	1.3447E+00
	Core.2	3.8630E+08	1.2349E+02	1.9003E+02	1.5387E+00
	Core.3	1.4282E+08	9.6386E+01	1.5052E+02	1.5616E+00
1020	Core.1	3.3524E+08	1.4374E+02	1.9369E+02	1.3475E+00
	Core.2	3.8054E+08	1.2165E+02	1.8725E+02	1.5392E+00
	Core.3	1.4025E+08	9.4653E+01	1.4689E+02	1.5518E+00
1080	Core.1	3.3489E+08	1.4359E+02	1.9318E+02	1.3454E+00
	Core.2	3.8326E+08	1.2252E+02	1.8845E+02	1.5381E+00
	Core.3	1.4157E+08	9.5545E+01	1.4867E+02	1.5560E+00
1380	Core.1	3.3399E+08	1.4320E+02	1.9284E+02	1.3467E+00
	Core.2	3.7808E+08	1.2087E+02	1.8574E+02	1.5368E+00
	Core.3	1.3948E+08	9.4137E+01	1.4555E+02	1.5461E+00
1440	Core.1	3.3386E+08	1.4315E+02	1.9249E+02	1.3447E+00
	Core.2	3.8120E+08	1.2186E+02	1.8719E+02	1.5361E+00
	Core.3	1.4093E+08	9.5110E+01	1.4754E+02	1.5512E+00
1740	Core.1	3.3239E+08	1.4251E+02	1.9165E+02	1.3448E+00
	Core.2	3.7642E+08	1.2034E+02	1.8454E+02	1.5335E+00
	Core.3	1.3919E+08	9.3937E+01	1.4479E+02	1.5413E+00
1800	Core.1	3.3254E+08	1.4258E+02	1.9150E+02	1.3431E+00
	Core.2	3.7981E+08	1.2142E+02	1.8617E+02	1.5333E+00
	Core.3	1.4068E+08	9.4943E+01	1.4690E+02	1.5472E+00
2100	Core.1	3.3067E+08	1.4178E+02	1.9031E+02	1.3423E+00
	Core.2	3.7532E+08	1.1998E+02	1.8356E+02	1.5299E+00
	Core.3	1.3919E+08	9.3936E+01	1.4441E+02	1.5373E+00

Table. Region powers and power peaking factors (Tokyo Tech)

Mode.3					
	ZONE	Power(Watts)	Power Density (Watts/cc)	Peak Density (Watts/cc)	Peak to AVG. Power Density
0	Core1	3.49E+08	1.54E+02	2.02E+02	1.312E+00
	Core2	3.99E+08	1.30E+02	1.96E+02	1.508E+00
	Core3	1.40E+08	9.51E+01	1.45E+02	1.525E+00
300	Core1	3.48E+08	1.54E+02	2.02E+02	1.312E+00
	Core2	3.93E+08	1.28E+02	1.93E+02	1.508E+00
	Core3	1.38E+08	9.37E+01	1.42E+02	1.515E+00
360	Core1	3.49E+08	1.55E+02	2.03E+02	1.310E+00
	Core2	3.94E+08	1.28E+02	1.94E+02	1.516E+00
	Core3	1.38E+08	9.37E+01	1.42E+02	1.515E+00
660	Core1	3.46E+08	1.54E+02	2.01E+02	1.305E+00
	Core2	3.88E+08	1.27E+02	1.91E+02	1.504E+00
	Core3	1.37E+08	9.28E+01	1.40E+02	1.509E+00
720	Core1	3.47+e08	1.54E+02	2.02E+02	1.312E+00
	Core2	3.90E+08	1.27E+02	1.92E+02	1.512E+00
	Core3	1.37E+08	9.30E+01	1.41E+02	1.516E+00
1020	Core1	3.44E+08	1.53E+02	1.99E+02	1.301E+00
	Core2	3.85E+08	1.26E+02	1.89E+02	1.500E+00
	Core3	1.36E+08	9.25E+01	1.39E+02	1.503E+00
1080	Core1	3.45E+08	1.53E+02	2.00E+02	1.307E+00
	Core2	3.87E+08	1.26E+02	1.90E+02	1.508E+00
	Core3	1.37E+08	9.27E+01	1.40E+02	1.510E+00
1380	Core1	3.41E+08	1.51E+02	1.96E+02	1.298E+00
	Core2	3.84E+08	1.25E+02	1.87E+02	1.496E+00
	Core3	1.36E+08	9.24E+01	1.39E+02	1.504E+00
1440	Core1	3.43E+08	1.52E+02	1.98E+02	1.303E+00
	Core2	3.86E+08	1.26E+02	1.88E+02	1.492E+00
	Core3	1.37E+08	9.27E+01	1.39E+02	1.499E+00
1740	Core1	3.38E+08	1.50E+02	1.94E+02	1.293E+00
	Core2	3.82E+08	1.25E+02	1.85E+02	1.480E+00
	Core3	1.37E+08	9.27E+01	1.38E+02	1.489E+00
1880	Core1	3.40E+08	1.51E+02	1.96E+02	1.298E+00
	Core2	3.85E+08	1.25E+02	1.87E+02	1.496E+00
	Core3	1.37E+08	9.29E+01	1.39E+02	1.496E+00
2100	Core1	3.35E+08	1.49E+02	1.91E+02	1.282E+00
	Core2	3.81E+08	1.24E+02	1.84E+02	1.484E+00
	Core3	1.37E+08	9.30E+01	1.39E+02	1.495E+00

Table.11 Volume averaged neutron spectra in the core (ANL)

Mode.3									
day	0			300			360		
Energy	Core.1	Core.2	Core.3	Core.1	Core.2	Core.3	Core.1	Core.2	Core.3
1.41E+07	2.16E+11	1.88E+11	1.31E+11	2.16E+11	1.83E+11	1.27E+11	2.16E+11	1.83E+11	1.27E+11
1.00E+07	3.82E+12	3.32E+12	2.28E+12	3.84E+12	3.24E+12	2.22E+12	3.84E+12	3.26E+12	2.23E+12
6.07E+06	1.84E+13	1.59E+13	1.08E+13	1.85E+13	1.55E+13	1.05E+13	1.85E+13	1.56E+13	1.05E+13
3.68E+06	5.01E+13	4.17E+13	2.71E+13	5.03E+13	4.08E+13	2.63E+13	5.03E+13	4.10E+13	2.65E+13
2.23E+06	1.03E+14	8.22E+13	4.79E+13	1.04E+14	8.05E+13	4.67E+13	1.04E+14	8.08E+13	4.69E+13
1.35E+06	1.72E+14	1.35E+14	7.96E+13	1.73E+14	1.32E+14	7.76E+13	1.73E+14	1.32E+14	7.80E+13
8.21E+05	2.85E+14	2.20E+14	1.34E+14	2.85E+14	2.15E+14	1.31E+14	2.85E+14	2.16E+14	1.32E+14
4.98E+05	3.45E+14	2.64E+14	1.61E+14	3.45E+14	2.58E+14	1.58E+14	3.45E+14	2.60E+14	1.58E+14
3.02E+05	3.51E+14	2.66E+14	1.60E+14	3.51E+14	2.60E+14	1.57E+14	3.51E+14	2.61E+14	1.57E+14
1.83E+05	3.15E+14	2.37E+14	1.39E+14	3.15E+14	2.33E+14	1.36E+14	3.15E+14	2.33E+14	1.37E+14
1.11E+05	2.58E+14	1.94E+14	1.10E+14	2.57E+14	1.90E+14	1.08E+14	2.58E+14	1.90E+14	1.08E+14
6.74E+04	2.54E+14	1.87E+14	1.08E+14	2.53E+14	1.83E+14	1.06E+14	2.53E+14	1.84E+14	1.06E+14
4.09E+04	1.56E+14	1.14E+14	5.94E+13	1.55E+14	1.12E+14	5.80E+13	1.55E+14	1.12E+14	5.83E+13
2.48E+04	1.87E+14	1.33E+14	7.23E+13	1.86E+14	1.30E+14	7.06E+13	1.87E+14	1.31E+14	7.09E+13
1.50E+04	1.12E+14	7.72E+13	3.49E+13	1.12E+14	7.56E+13	3.41E+13	1.12E+14	7.59E+13	3.42E+13
9.12E+03	6.12E+13	4.08E+13	1.60E+13	6.08E+13	3.99E+13	1.56E+13	6.09E+13	4.01E+13	1.57E+13
5.53E+03	5.04E+13	3.27E+13	1.32E+13	5.00E+13	3.20E+13	1.29E+13	5.01E+13	3.22E+13	1.30E+13
3.36E+03	2.92E+13	1.83E+13	6.71E+12	2.89E+13	1.79E+13	6.53E+12	2.89E+13	1.80E+13	6.57E+12
2.04E+03	1.60E+13	9.60E+12	3.44E+12	1.58E+13	9.37E+12	3.33E+12	1.59E+13	9.41E+12	3.35E+12
1.23E+03	6.67E+12	3.86E+12	1.29E+12	6.57E+12	3.76E+12	1.25E+12	6.59E+12	3.78E+12	1.25E+12
7.49E+02	3.24E+12	1.86E+12	6.65E+11	3.15E+12	1.79E+12	6.34E+11	3.17E+12	1.81E+12	6.39E+11
4.54E+02	9.22E+11	5.15E+11	2.08E+11	8.91E+11	4.95E+11	1.96E+11	8.96E+11	4.99E+11	1.98E+11
3.04E+02	5.47E+11	2.99E+11	1.68E+11	5.12E+11	2.80E+11	1.53E+11	5.18E+11	2.84E+11	1.55E+11
1.49E+02	8.03E+10	4.33E+10	4.29E+10	7.13E+10	3.90E+10	3.78E+10	7.27E+10	3.97E+10	3.86E+10
9.17E+01	1.90E+10	1.05E+10	1.48E+10	1.53E+10	8.76E+09	1.22E+10	1.59E+10	9.02E+09	1.26E+10
6.79E+01	1.39E+10	7.98E+09	1.47E+10	1.01E+10	6.11E+09	1.13E+10	1.06E+10	6.38E+09	1.18E+10
4.02E+01	4.85E+09	2.88E+09	5.78E+09	3.58E+09	2.24E+09	4.52E+09	3.76E+09	2.34E+09	4.71E+09
2.26E+01	8.80E+08	5.22E+08	7.10E+08	6.53E+08	4.08E+08	5.55E+08	6.85E+08	4.25E+08	5.78E+08
1.37E+01	7.75E+08	4.54E+08	6.92E+08	3.86E+08	2.57E+08	4.00E+08	4.30E+08	2.81E+08	4.36E+08
8.32E+00	1.87E+08	1.09E+08	1.36E+08	1.00E+08	6.55E+07	8.07E+07	1.10E+08	7.09E+07	8.77E+07
3.99E+00	8.70E+08	5.79E+08	1.42E+09	5.62E+08	4.22E+08	1.11E+09	6.01E+08	4.43E+08	1.15E+09
5.41E-01	4.55E+07	2.84E+07	6.20E+07	2.26E+07	1.64E+07	3.93E+07	2.50E+07	1.77E+07	4.20E+07
4.14E-01	7.12E+07	4.26E+07	5.60E+07	1.32E+07	1.05E+07	1.77E+07	1.66E+07	1.28E+07	2.08E+07

Table.11 Volume averaged neutron spectra in the core (Tokyo Tech)

Mode.3						
day	0			300		
Energy	Core.1	Core.2	Core.3	Core.1	Core.2	Core.3
1.00E+07	2.86E+12	2.35E+12	1.47E+12	2.87E+12	2.32E+12	1.46E+12
6.07E+06	7.91E+12	6.51E+12	4.07E+12	7.94E+12	6.44E+12	4.02E+12
3.68E+06	1.41E+13	1.11E+13	6.54E+12	1.41E+13	1.10E+13	6.47E+12
2.23E+06	2.14E+13	1.63E+13	8.92E+12	2.15E+13	1.61E+13	8.84E+12
1.35E+06	2.84E+13	2.09E+13	1.09E+13	2.85E+13	2.07E+13	1.09E+13
8.21E+05	6.81E+13	4.90E+13	2.57E+13	6.80E+13	4.84E+13	2.54E+13
3.88E+05	6.50E+13	4.66E+13	2.48E+13	6.49E+13	4.60E+13	2.46E+13
1.83E+05	5.64E+13	4.01E+13	2.16E+13	5.62E+13	3.96E+13	2.14E+13
8.65E+04	3.59E+13	2.54E+13	1.40E+13	3.57E+13	2.50E+13	1.39E+13
4.09E+04	2.78E+13	1.93E+13	1.08E+13	2.76E+13	1.91E+13	1.07E+13
1.93E+04	1.15E+13	7.89E+12	4.48E+12	1.14E+13	7.77E+12	4.43E+12
9.12E+03	4.66E+12	3.16E+12	1.80E+12	4.60E+12	3.11E+12	1.78E+12
4.31E+03	5.91E+12	3.88E+12	2.18E+12	5.78E+12	3.79E+12	2.14E+12
2.03E+03	2.36E+12	1.51E+12	8.84E+11	2.28E+12	1.46E+12	8.60E+11
9.61E+02	6.64E+11	4.13E+11	2.61E+11	6.28E+11	3.94E+11	2.51E+11
4.54E+02	1.42E+11	8.77E+10	6.39E+10	1.30E+11	8.11E+10	6.01E+10
2.14E+02	2.91E+10	1.83E+10	1.55E+10	2.52E+10	1.63E+10	1.41E+10
1.01E+02	9.59E+09	6.39E+09	5.85E+09	7.00E+09	4.99E+09	4.86E+09
2.38E+00	2.25E+06	1.49E+06	1.61E+06	1.13E+06	9.11E+05	1.14E+06
4.14E-01	9.07E+04	6.74E+04	6.70E+04	8.62E+03	9.31E+03	1.40E+04
6.40E-02	1.89E+03	1.40E+03	1.38E+03	8.69E+01	1.12E+02	1.94E+02
1.00E-05	1.89E+03	1.40E+03	1.38E+03	8.69E+01	1.12E+02	1.94E+02

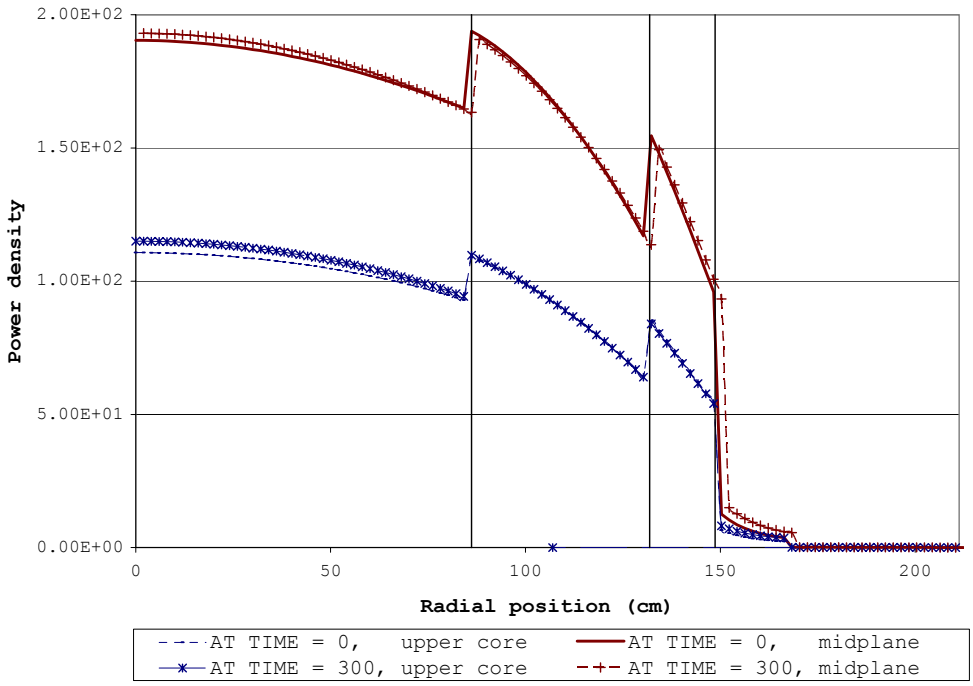


Fig.7 Radial power profiles in the core for subcycle.1 (ANL)

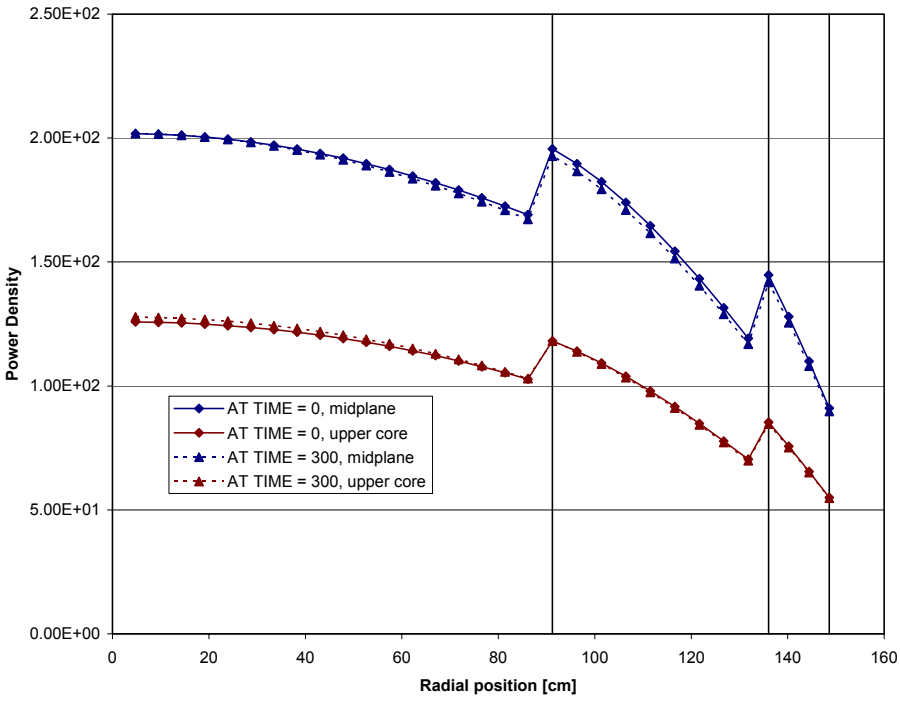


Fig.8 Radial power profiles in the core for subcycle.1 (Tokyo Tech)