

## APOLLO code Results for the FBNR reactor core

### 1. The $K_{inf}$ for the FBNR unit cell

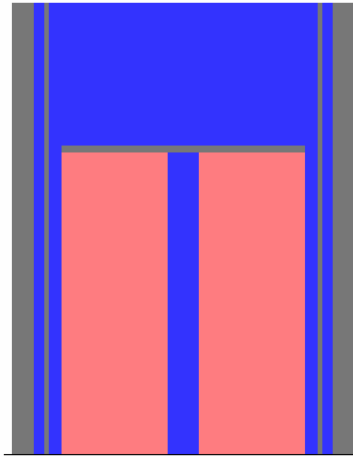
FBNR cell geometry was considered as a sphere. The Apollo code can't, for the moment, take into account the geometry proposed in the FBNR data sent, June 25, 2007.

**$K_{inf}$  (Unit Cell) = 1.318442822**

### 2. The results of $K_{eff}$ for the whole reactor

#### A - Methodology used

- The 100 cm height water in the upper part of the core reactor was taken into account.
- 5% enrichment.
- The Self-Shielding was calculated only at 0.00 MWD/T.



#### B- Results

**$K_{eff} = 1.2364868$**

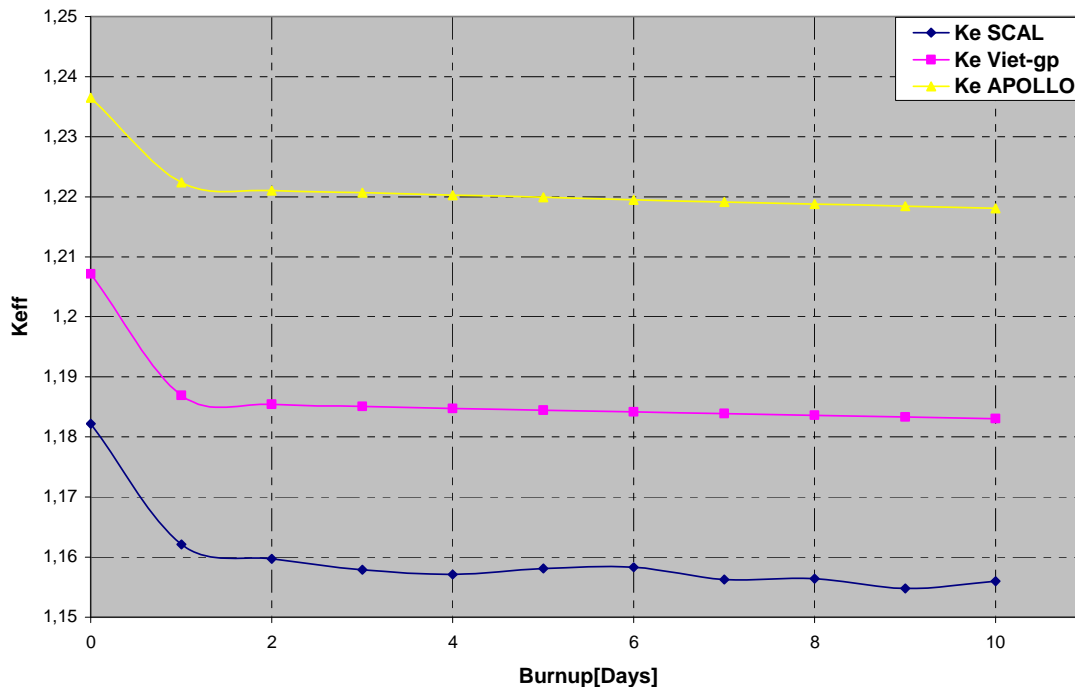
According to the APOLLO code results, the life time of the FBNR is about 5 years.

The  $K_{eff}$  values found by SCALE code, Vietnamese Group, and Apollo code are introduced in the table below.

Days	MWD/Ton	$K_e$ (SCAL)	$K_e$ (Viet GP)	$K_e$ (APOLLO)
0	0.000	1,1822	1,20718	1,2365
1	13,787	1,1621	1,186924	1,222
2	27,574	1,1597	1,185474	1,2210
3	41,361	1,1579	1,185083	1,2206
4	55,148	1,1571	1,184759	1,2203
5	68,935	1,1581	1,184451	1,2199
6	82,722	1,1583	1,184153	1,2195
7	96,509	1,1563	1,183867	1,2191
8	110,296	1,1564	1,183587	1,2188
9	124,083	1,1548	1,183316	1,2184

10	137,87	1,156	1,183053	1,2181
120	1654,44	1,1389		1,1978
240	3308,88	1,1205		1,1809
360	4963,32	1,1023		1,1638
480	6617,76	1,0896		1,1469
600	8272,2	1,0695		1,1306
720	9926,64	1,0566		1,1151
840	11581,08	1,0425		1,1004
960	13235,52	1,0267		1,0863
1080	14889,96	1,0124		1,0729
1200	16544,4	0,997		1,0600
1320	18198,84	0,9841		1,0477
1440	19853,28	0,9716		1,0358
1560	21507,72	0,9585		1,0242
1680	23162,16	0,9451		1,0131
1800	24816,6	0,9331		1,0022
1920	26471,04	0,9199		0,9916
2040	28125,48	0,9095		0,9813
2160	29779,92	0,8983		0,9712
2200	30331,4	0,8936		0,9679

**Keff vs. Burnup for the FBNR whole reactor core (In the first 10 days)**



Keff vs. Burnup for the FBNR whole reactor core

