From: ISHIKAWA Makoto
Sent: Monday, February 22, 2010 10:50
Subject: RZ model of a 600MWe FBR core by JAEA

Dear Colleagues,

This is Ishikawa at JAEA, Japan.

> I would extend the same
> request to our Japanese colleagues for providing the JAEA FBR
> specifications (again simplified cylindrical model and composition)
> that has been proposed as alternative to the ABR as target design.

I also prepared a simplified RZ model of a 600 MWe FBR core which was designed by JAEA (old PNC) in 1992.

The pdf file attached shows the core layout of the 600MWe FBR and the major specification and core-parameter values based on the JAEA design work.

The EXCEL file attached gives the simplified RZ model and the region-wise compositions in the first 2-sheets. The keff values of the simplified RZ model by a diffusion-theory, homogeneous-cell, 70 energy-group based on preliminary JENDL-4 library calculation was 1.0522.

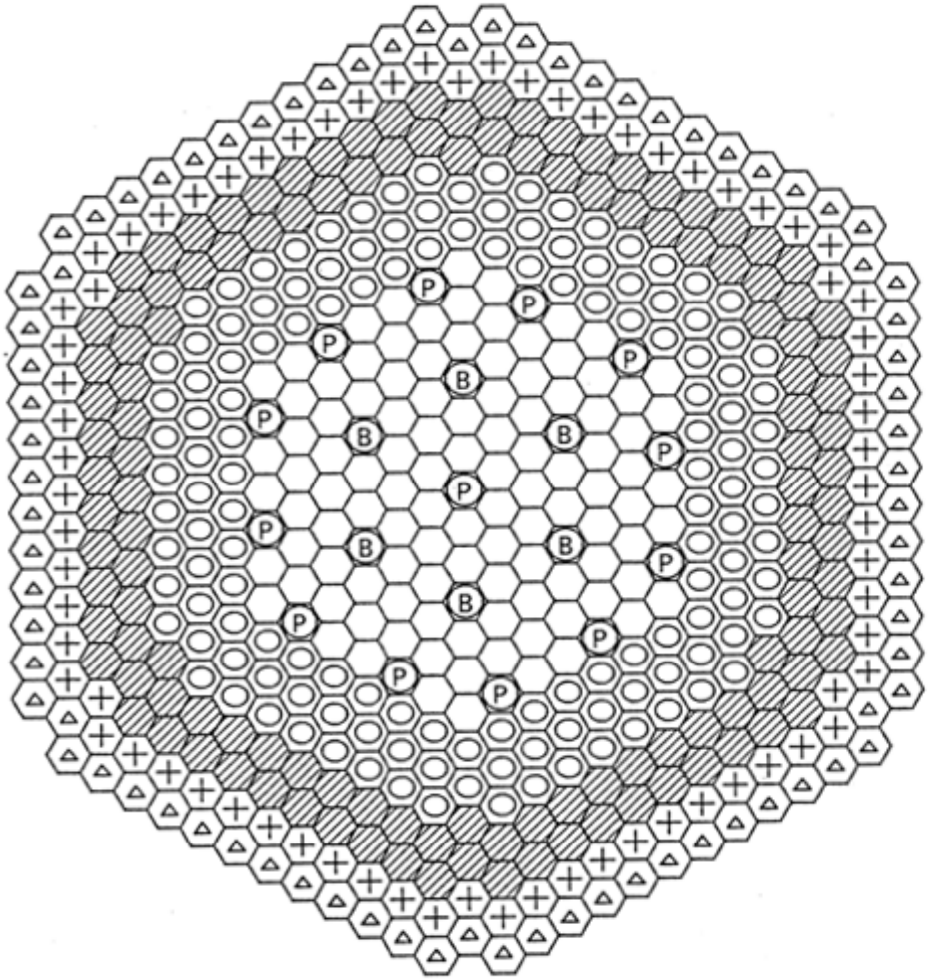
(Although I added a detailed RZ model in the next 2-sheets as a reference, which is similar with the region-number of the ANL's ABR model, I do not recommend to use it in our benchmark, since we do not need such detailed target-core model from the SG-33 objective.)

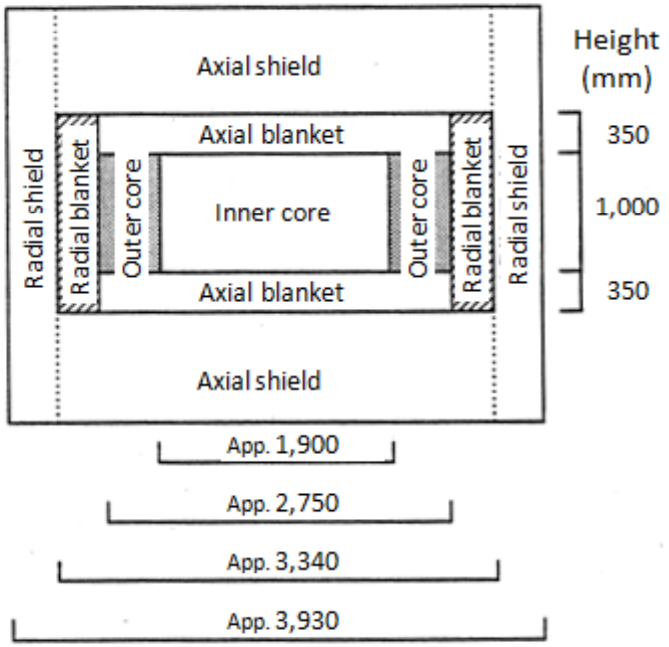
If you have any ambiguous points in the JAEA model, please let me know.

Sincerely yours.

Feb. 22, 2010

M.Ishikawa





Inner core		108
Outer core		138
Radial blanket		126
Stainless Steel Shield		72
B_4C Shield		78
Primary control rod		13
Backup control red		6
	Total	541

Figure.1 Layout of a 600 MWe FBR core by JAEA

Table 1 Specification and Performance of A 600 MWe FBR Core by JAEA

(Ref.) H.Hayashi, M.Ishikawa, et al.:"Progress Report of the Design Study on a Large Scale Reactor – Design Study on a 600MWe Class Plant –", PNC TN9410 92-137, May 1992.

Specification		Value
Thermal power (MWt)		1,600
Primary coolant	Inlet Temperature (C)	380
	Outlet temperature (C)	530
	Flow rate (kg/s)	8.41E3
Operating cycle length (days)		375
Fuel type, Batch number		MOX, 3
Pu enrichment (Inner/Outer core) (weight %)		17.1/ 20.9
Pu isotopic ratio (Pu-238:239: 240:241:242) (weight %)		3:53: 55:12:7

Performance		Value
Maximum linear power at BOC (w/cm)	BOEC (Inner/Outer core)	470/460
	EOEC (Inner/Outer core)	442/434
Breeding Ratio (BOEC/EOEC)		1.24/1.23
Burnup reactivity loss per cycle (%dk/kk')		2.70
Average burnup rate of discharged fuel		85,700
Control rod worth (Primary/Backup) (%dk/kk')		7.9/2.7
Sodium void reactivity (BOEC) ($)		4.3
Doppler reactivity (BOEC) (Tdk/dT)		-1.0E-2