PNC TN941 79－194

ＤＣＡ炉心実験データ集（14）

22.5cmピッチ格子における共鳴捕獲比の測定

１９７９年１０月

動力炉・核燃料開発事業団

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ＤＣＡ炉心実験データ集（14）
22.5cmピッチ格子における共鳴捕獲比の測定

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要　　旨

プルトニウム燃料を装荷した２２.５cm ピッチ格子において，共鳴捕獲比 ρ^{28} の測定をおこなった。使用したプルトニウム燃料は，0.８７w／o富化 PuO_2-UO_2 のスタンダードグレイド(8sPu)とリアクターグレイド(8RPu)の２種類の燃料であった。冷却材ボイド率は０％ボイド(H_2O)と１００％ボイド（空気）であった。

共鳴捕獲比 ρ^{28} は劣化ウラン箔の裸箔とカドミ・カバー箔を用いた箔放射化法によって求められた。カドミ・カバーによる熱中性子束の歪因子を劣化ウランのカドミ比に乗じて補正した。（0.５４w／o PuO_2-UO_2 燃料装荷実験結果もこの補正を加えて再録した。）

共鳴捕獲比 ρ^{28} の測定結果を下表に示す。

表　２２.５cm格子ピッチにおける共鳴捕獲比 ρ^{28} の測定結果

格子体系＼燃料棒位置	第一層	第二層	第三層	格子平均
8RPu－　0％Void	1.６９	1.３１	0.９５１	1.１０
8RPu－100％Void	2.４２	2.００	1.９６	2.０２
8sPu－　0％Void	1.９０	1.５２	1.０９	1.２６
8sPu－100％Void	2.５４	2.２３	1.９６	2.０８
5sPu－　0％Void	1.３９	1.２１	0.８７７	1.００
5sPu－ 30％Void	1.８３	1.４３	1.０８	1.２３
5sPu－ 70％Void	2.２７	1.７３	1.２３	1.４３
5sPu－100％Void	1.７２	1.５９	1.４３	1.５０

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Experimental Data in DCA (14)

－ Resonance Capture Ratio in 22.5 cm Pitch Lattice －

Akito NISHI , Nobuo FUKUMURA*,
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Abstract

Resonance capture ratio ρ^{28} has been measured in plutonium fuel lattices at 22.5 cm pitch. The fuels used in the experiment were 0.87 w/o PuO_2(standard grade)-UO_2[8sPu] and 0.87 w/o PuO_2(reactor grade)-UO_2[8RPu]. H_2O[0% Void fraction] and air[100% Void fraction] were used as "coolants".

The ρ^{28} values in fuel rods on each layer of the cluster were obtained from the Cd-ratio of ^{238}U capture with the foil activation method in using depleted uranium. The values of activities in the Cd-covered foils were corrected for the flux perturnation due to the presence of Cd-cover. (Experimental results of ρ^{28} in the fuel rods of 0.54 w/o PuO_2-UO_2[5sPu] issued befor, are also corrected and reprinted in this report)

The resonance capture ratio ρ^{28} are given in the following table.

Table Experimental Results of Resonance Capture Ratio ρ^{28} at 22.5 cm Pitch Lattice

Lattice condition \ Fuel Pin position	1st	2nd	3rd	Cell
8RPu- 0% Void	1.69	1.38	0.951	1.10
8RPu-100% Void	2.42	2.00	1.96	2.02
8RPu- 0% Void	1.90	1.52	1.09	1.26
8RPu-100% Void	2.54	2.23	1.96	2.08
5SPu- 0% Void	1.39	1.21	0.877	1.00
5SPu- 30% Void	1.83	1.43	1.08	1.23
5SPu- 70% Void	2.27	1.73	1.23	1.43
5SPu-100% Void	1.72	1.59	1.43	1.50

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** Present Address: Mitsubishi Heavy Industries Ltd.

1. Experimental Conditions.

Table 1-1 Core Description

Core No.		A9-2	A9-1	A7-2	A7-1
Fuel loading	Center	25-8RPu	25-8RPu	9-8SPu	25-8SPu
	Outer	96-1.2U	96-1.2U	108-1.2U	96-1.2U
Coolant	Void	0% (H_2O)	100% (Air)	0% (H_2O)	100% (Air)
	Height	83.5 cm	0 cm	83.5 cm	0 cm
Lattice Pitch		Square at 22.5cm pitch			
Moderater (D_2O)	Height	83.11cm	103.21cm	82.74cm	93.58cm
	^{10}B in D_2O	<0.1 ppm	<0.1 ppm	<0.1 ppm	<0.1 ppm
Core ID		22.5cm-8RPu-0%	22.5cm-8RPu-100%	22.5cm-8SPu-0%	22.5cm-8SPu-100%

Table 1-2 Fuel Description

(1) 1.2U

	Inner Dia. (cm)	Outer Dia. (cm)	Material	Density (g/cm^3)
Pellet	——	1.480	1.203w/o enriched UO_2	10.36
Gap	1.480	1.503	Helium	——
Sheath	1.503	1.673	Aluminium	2.674

Composition		w/o
Pellet	U-235	1.057
	U-238	86.793
	O	12.150
Sheath	Al	96.98
	Mg	2.60

(2) 5(S)Pu

	Inner Dia. (cm)	Outer Dia. (cm)	Material	Density (g/cm^3)
Pellet	——	1.469	0.542w/o enriched PuO_2-UO_2	10.17
Gap	1.469	1.506	Helium	——
Sheath	1.506	1.668	Zry-2	6.523

Composition		w/o
Pellet	U-235	0.6214
	U-238	36.782
	Pu-238	0.000102
	Pu-239	0.4304
	Pu-240	0.04115
	Pu-241	0.004359
	Pu-242	0.000303
	O	12.12
Sheath	Zr	98.22
	Sn	1.48
	Fe	0.14
	Cr	0.10
	Ni	0.06

Date of Analysis: 23 August 1971

Table 1-2 Fuel Description

(3) 8(S)Pu

	Inner Dia. (cm)	Outer Dia. (cm)	Material	Density (g/cm^3)
Fellet	——	1.472	0.862w/o enriched PuO_2-UO_2	10.17
Gap	1.472	1.506	Helium	——
Sheath	1.506	1.668	Zry-2	6.523

Composition		w/o
Pellet	U-235	0.6194
	U-238	86.503
	Pu-238	0.000145
	Pu-239	0.6849
	Pu-240	0.06584
	Pu-241	0.006960
	Pu-242	0.000510
	O	12.12
Sheath	Zr	98.22
	Sn	1.48
	Fe	0.14
	Cr	0.10
	Ni	0.06

Date of Analysis: 23 August 1971

(4) 8(R)Pu

	Inner Dia. (cm)	Outer Dia. (cm)	Material	Density (g/cm^3)
Pellet	——	1.468	0.874w/o enriched PuO_2-UO_2	10.25
Gap	1.468	1.506	Helium	——
Sheath	1.506	1.668	Zry-2	6.523

Composition		w/o
Pellet	U-235	0.6194
	U-238	86.493
	Pu-238	0.00641
	Pu-239	0.4953
	Pu-240	0.1661
	Pu-241	0.07217
	Pu-242	0.02296
	O	12.13
Sheath	Zr	98.22
	Sn	1.48
	Fe	0.14
	Cr	0.10
	Ni	0.06

Date of Analysis: 16 June 1973

Table 1-3 Fuel Ring Description

28 elements assembly in 3 circular rings

Ring	No. of elements	Pitch circle dia of elements centers (cm)
1	4	2.625
2	8	6.000
3	16	9.515

Table 1-4 Channel Assembly Description

	Inner Dia. (cm)	Outer Dia. (cm)	Material	Density (g/cm^3)
Pressure Tube	11.68	12.88	Aluminum Alloy	2.674
Air Gap	12.08	13.25	Air	0.001745
Calandria Tube	13.25	13.65	Aluminum Alloy	2.674

Composition		w/o in Al	w/o in Air	Atomic No. Density
Al		96.98		0.05788
Mg		2.60		0.00172
Air	O		23.5204	0.00001067
	N		76.4796	0.00003962

Table 1-5 Coolant Description

Material (w/o) / Coolant Void Fraction	H_2O	D_2O	H_3BO_3	Air
0 %	100	0	0	0
30 %	63.17	36.82	0.0092	0
70 %	18.07	81.91	0.0215	0
100 %	0	0	0	100

Table 1-6 Moderator Description

(1) Non B-Bearing Moderator

Density of Moderator (D_2O: 99.42 mol/o) 1.1045, 22°C

Material	w/o in Moderator	Density (g/cm^3)
D_2O	99.48	1.10504
H_2O	0.52	0.99777

Ingredient	w/o in Moderator	Atomic No. density ($/cm^3 \times 10^{24}$)
H	0.05819	0.0003840
D	20.0083	0.06608
O	79.9345	0.03323
B	<0.00001	<0.0000005

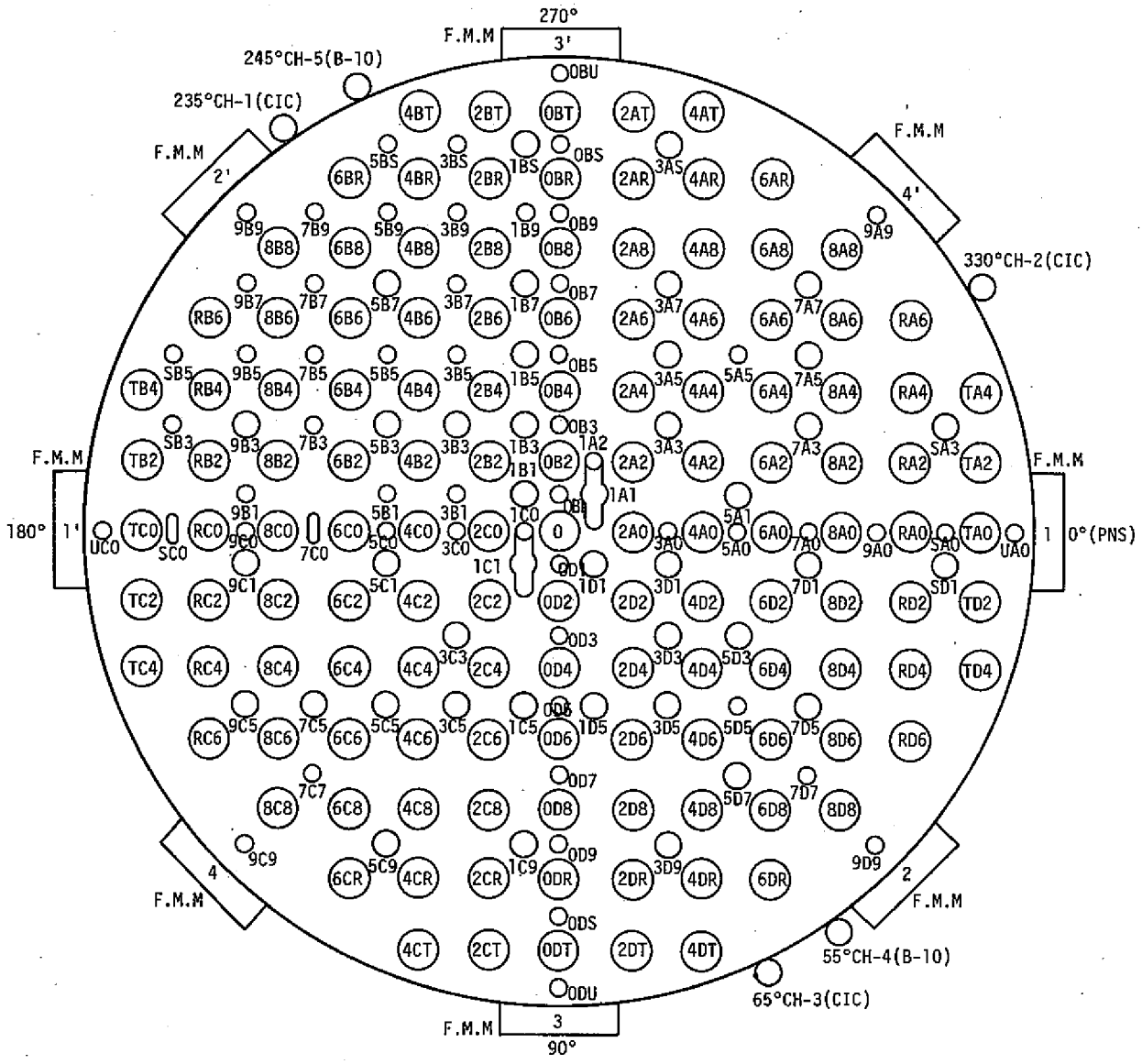


Fig. 1-1 Core Configuration of DCA
(Squre Lattice of 22.5 cm Pitch)

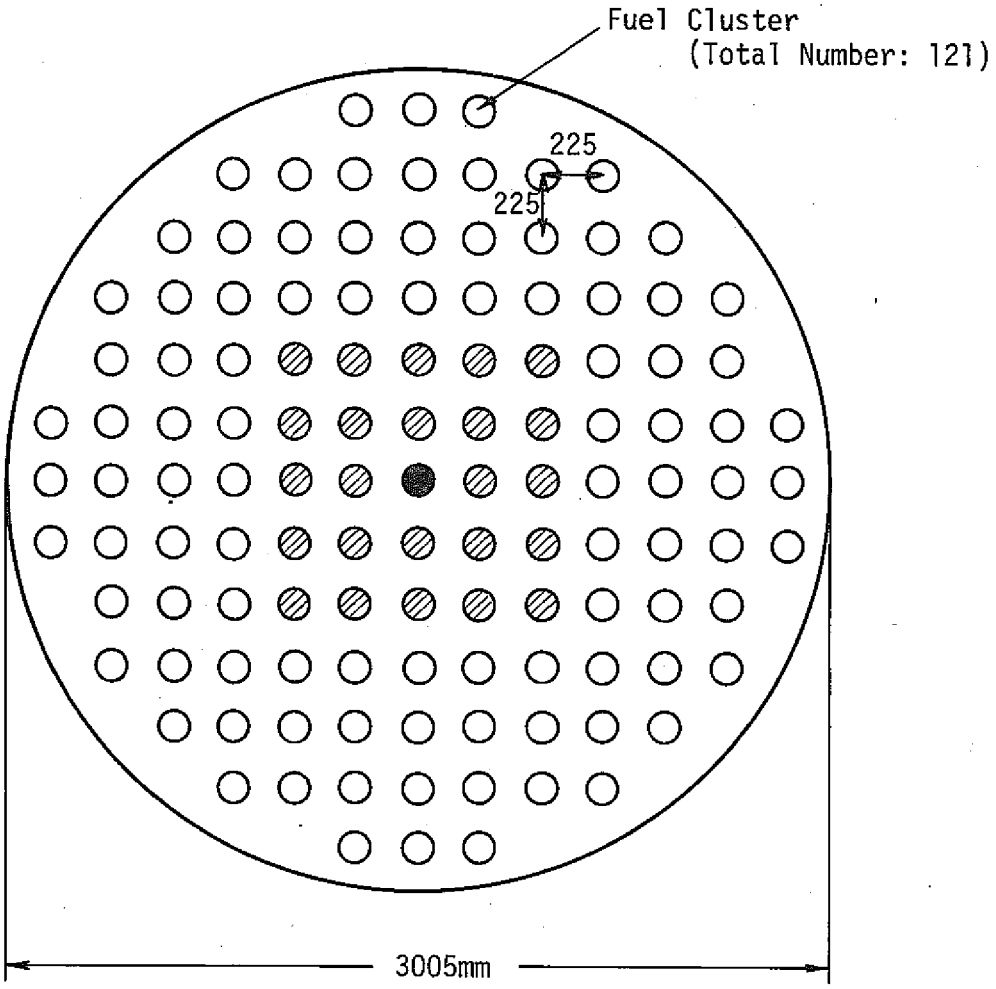
2. Measurement Conditions

Table 2-1 Detector Foil Description

Foil ID	Dimension	Content	Measured Quantity
DU (DUB)	14.8 mmϕ 0.10 mmt	274 ppm ^{235}U depleted U-metal	ρ^{28}, δ^{28}
NU (old)	14.8 mmϕ 0.12 mmt	Natural (0.72w/o ^{235}U) U-metal	δ^{28}

Table 2-2 Irradiation Description

Foil	Core ID	D_2O Critical Level	Power(w) × Time(m)
DU/NU	22.5 cm-8RPu- 0%	83.54 cm	1 Kw × 75 m
	-8RPu-100%	103.76 cm	
	-8SPu- 0%	83.43 cm	
	-8SPu-100%	93.82 cm	



● PuO_2-UO_2 Fuel Cluster with Irradiated Foils

▨ PuO_2-UO_2 Fuel Cluster with Irradiated Foils

○ 1.2 w/o UO_2 Fuel Cluster with Irradiated Foils

Fig. 2-1 Lattice Arrangement for Activation

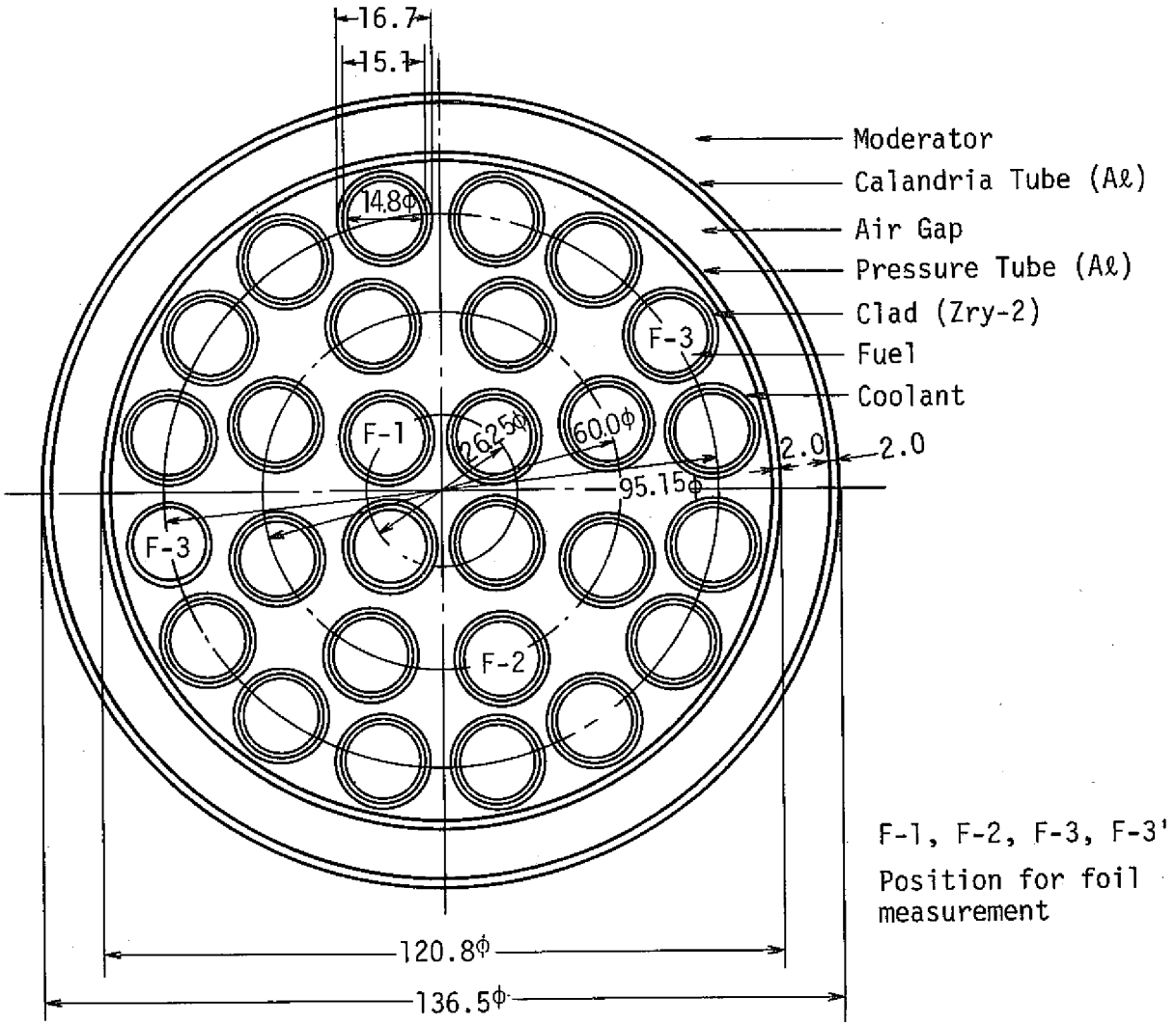


Fig. 2-2 Cross Sectional View of Fuel Cluster

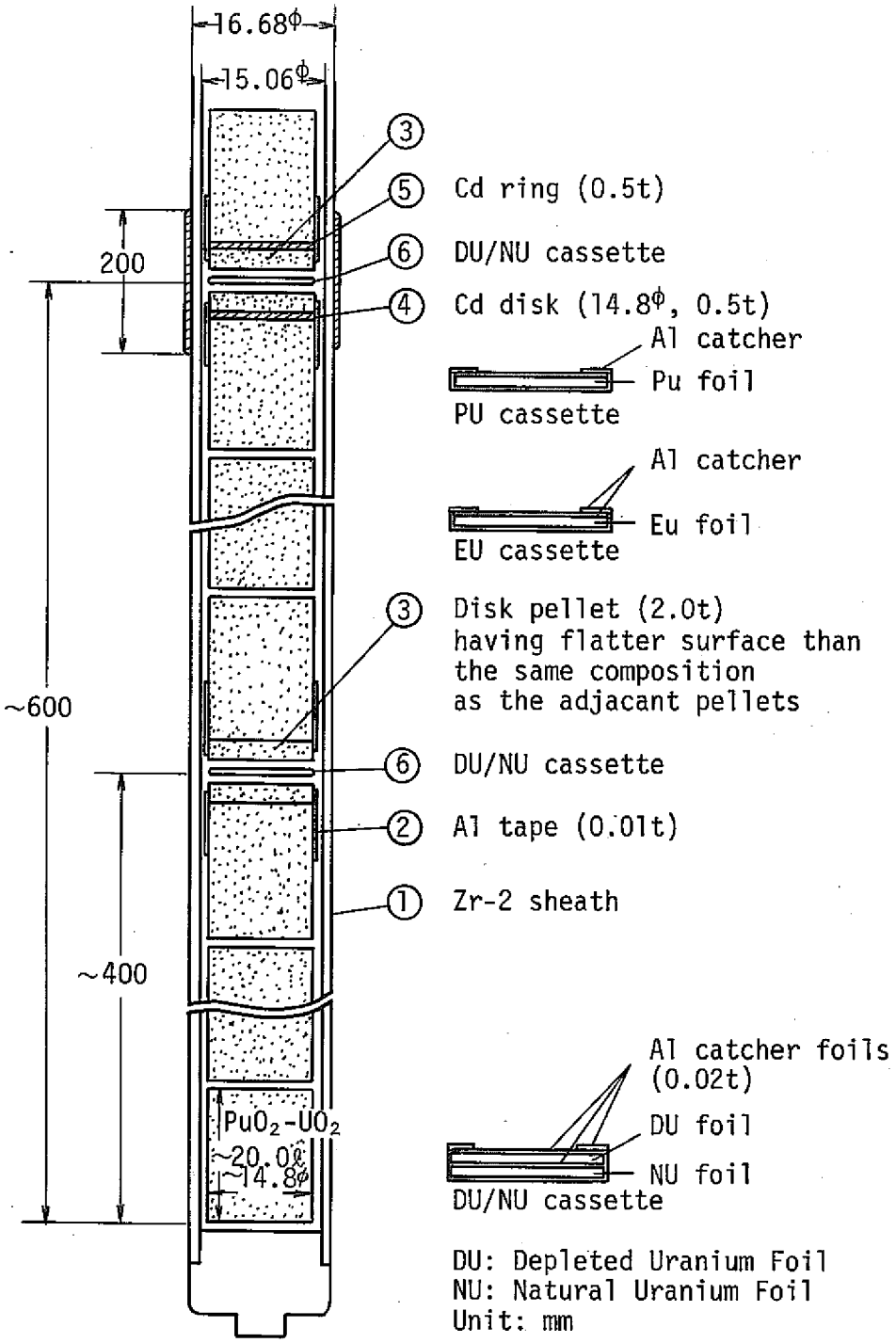


Fig. 2-3 Foil Arrangement in PuO_2-UO_2 Fuel Pin.

3. Resonance Capture Rate

Table 3-1 Definition of Resonance Capture Rate ρ^{28}

(1) Definition of ρ^{28}

$$\rho^{28} \equiv \int_{Ecd}^{\infty} \sigma_c^{28}(E)\phi(E)dE \Big/ \int_{0}^{Ecd} \sigma_c^{28}(E)\phi(E)dE$$

where Ecd is the Cd cut-off energy,

σ_c^{28}; the capture cross section of ^{238}U.

(2) Evaluation of ρ^{28} from the Measured Quantities.

$$\rho^{28} = \left(\frac{[Np]_d^b}{[Np]_d^c} - 1 \right)^{-1}$$

where $[Np]_d^b$ and $[Np]_d^c$ are the ^{239}Np Activilies of bare and Cd-covered Depleted U foils, respectively.

Table 3-2-1 Data of ^{238}U- Capture Activities in DU Foils

****** ACTIVATION DATA ******

TITLE : DU CAPTURE & RAH

REACTOR CONDITION : 8RPu- 0% Void- 22.5cm LP

D_2O LEVEL 83.54cm

ITEM RING	FOIL ID	WEIGHT (mg)	HEIGHT (cm)	ACTIVITY (c.p.s)	ERROR (%)	COR. VAL. FOR THICKNESS	COR. VAL. FOR POWER	COR. VAL. FOR POSITION
BARE	DUB- 1	356.02	38.95	0.31021E 00	0.30	0.99142E-03	0.99142E-06	0.10000E-05
EP	DUB- 2	355.61	59.00	0.16121E 00	0.38	0.51567E-03	0.51567E-06	0.59805E-06
1 SUB						0.47575E-03	0.47575E-06	0.40198E-06
CD-R						0.19226E 01	0.19226E 01	0.16722E 01
ROH						0.10839E 01	0.10839E 01	0.14878E 01
BARE	DUB- 3	355.18	38.95	0.35801E 00	0.27	0.11463E-02	0.11463E-05	0.11562E-05
EP	DUB- 4	354.49	58.95	0.16814E 00	0.35	0.53913E-03	0.53913E-06	0.62465E-06
2 SUB						0.60712E-03	0.60712E-06	0.53156E-06
CD-R						0.21261E 01	0.21261E 01	0.18510E 01
ROH						0.88802E 00	0.88802E 00	0.11751E 01
BARE	DUB- 5	354.35	38.92	0.45643E 00	0.36	0.14640E-02	0.14640E-05	0.14769E-05
EP	DUB- 6	351.74	58.87	0.18175E 00	0.39	0.58626E-03	0.58626E-06	0.67820E-06
3 SUB						0.87773E-03	0.87773E-06	0.79870E-06
CD-R						0.24972E 01	0.24972E 01	0.21777E 01
RCH						0.66792E 00	0.66792E 00	0.84914E 00
BARE	DUB- 7	351.42	38.85	0.44877E 00	0.34	0.14486E-02	0.14486E-05	0.14618E-05
EP	DUB- 8	351.40	58.85	0.18379E 00	0.39	0.59327E-03	0.59327E-06	0.68606E-06
3 SUB						0.85530E-03	0.85530E-06	0.77574E-06
CD-R						0.24417E 01	0.24417E 01	0.21307E 01
ROH						0.69364E 00	0.69364E 00	0.88439E 00

Table 3-2-2 Data of ^{238}U- Capture Activities in DU Foils

****** ACTIVATION DATA ******

TITLE : DU CAPTURE & RAH

REACTOR CONDITION : 8RPu- 100% Void- 22.5cm LP

D_2O LEVEL 103.76cm

ITEM RING	FOIL ID	WEIGHT (mg)	HEIGHT (cm)	ACTIVITY (c.p.s)	ERROR (%)	COR. VAL. FOR THICKNESS	COR. VAL. FOR POWER	COR. VAL. FOR POSITION
BARE	DUB-09	350.55	40.00	0.21323E 00	0.79	0.68960E-03	0.68960E-06	0.70002E-06
EP	DUB-10	349.39	59.00	0.14475E 00	0.88	0.46932E-03	0.46932E-06	0.47163E-06
1 SUB						0.22028E-03	0.22028E-06	0.22829E-06
CD-R						0.14693E 01	0.14693E 01	0.14843E 01
ROH						0.21306E 01	0.21306E 01	0.20650E 01
BARE	DUB-17	343.95	38.00	0.23065E 00	0.72	0.75692E-03	0.75692E-06	0.77253E-06
EP	DUB-18	343.46	58.90	0.14880E 00	0.79	0.48885E-03	0.48885E-06	0.49118E-06
2 SUB						0.26808E-03	0.26808E-06	0.28135E-06
SD-R						0.15484E 01	0.15484E 01	0.15728E 01
ROH						0.18235E 01	0.18235E 01	0.17458E 01
BARE	DUB-19	342.40	39.00	0.29718E 00	0.80	0.97864E-03	0.97864E-06	0.99602E-06
EP	DUB-20	341.99	58.90	0.19065E 00	0.69	0.62842E-03	0.62842E-06	0.63142E-06
3 SUB						0.35022E-03	0.35022E-06	0.36460E-06
CD-R						0.15573E 01	0.15573E 01	0.15774E 01
ROH						0.17943E 01	0.17943E 01	0.17318E 01
BARE	DUB-21	341.89	38.90	0.30249E 00	0.57	0.99727E-03	0.99727E-06	0.10153E-05
EP	DUB-22	341.73	58.90	0.19208E 00	0.71	0.63351E-03	0.63351E-06	0.63653E-06
3 SUB						0.36377E-03	0.36377E-06	0.37872E-06
CD-R						0.15742E 01	0.15742E 01	0.15950E 01
ROH						0.17415E 01	0.17415E 01	0.16807E 01

Table 3-2-3 Data of ^{238}U- Capture Activities in DU Foils

****** ACTIVATION DATA ******

TITLE : DU CAPTURE & RAH

REACTOR CONDITION : 8SPu- 0% Void- 22.5cm LP

D_2O LEVEL 83.43cm

ITEM RING	FOIL ID	WEIGHT (mg)	HEIGHT (cm)	ACTIVITY (c.p.s)	ERROR (%)	COR. VAL. FOR THICKNESS	COR. VAL. FOR POWER	COR. VAL. FOR POSITION
BARE	DUB-54	325.82	39.30	0.34365E 00	0.71	0.11763E-02	0.11763E-05	0.11810E-05
EP	DUB-55	324.07	59.30	0.18133E 00	0.68	0.62334E-03	0.62334E-06	0.73654E-06
1 SUB						0.55298E-03	0.55298E-06	0.44445E-06
CD-R						0.18871E 01	0.18871E 01	0.16034E 01
ROH						0.11273E 01	0.11273E 01	0.16572E 01
BARE	DUB-56	325.58	39.30	0.38523E 00	0.70	0.13194E-02	0.13194E-05	0.13247E-05
EP	DUB-76	308.77	59.60	0.17917E 00	0.90	0.64000E-03	0.64000E-06	0.76094E-06
2 SUB						0.67944E-03	0.67944E-06	0.56375E-06
CD-R						0.20616E 01	0.20616E 01	0.17409E 01
ROH						0.94195E 00	0.94195E 00	0.13498E 01
BARE	DUB-77	308.54	39.90	0.46260E 00	1.06	0.16534E-02	0.16534E-05	0.16574E-05
EP	DUB-78	308.45	60.00	0.19262E 00	0.92	0.68862E-03	0.68862E-06	0.82573E-06
3 SUB						0.96482E-03	0.96482E-06	0.83171E-06
CD-R						0.24011E 01	0.24011E 01	0.20072E 01
ROH						0.71373E 00	0.71373E 00	0.99281E 00
BARE	DUB-79	308.21	40.10	0.45884E 00	0.83	0.16414E-02	0.16414E-05	0.16447E-05
EP	DUB-80	307.37	60.10	0.18924E 00	0.88	0.67846E-03	0.67846E-06	0.81530E-06
3 SUB						0.96295E-03	0.96295E-06	0.82537E-06
CD-R						0.24193E 01	0.24193E 01	0.20173E 01
ROH						0.70456E 00	0.70456E 00	0.98303E 00

Table 3-2-4 Data of ^{238}U- Capture Activities in DU Foils

****** ACTIVATION DATA ******

TITLE : DU CAPTURE & RAH

REACTOR CONDITION : 8SPu- 100% Void- 22.5cm LP

D_2O LEVEL 93.82cm

ITEM RING	FOIL ID	WEIGHT (mg)	HEIGHT (cm)	ACTIVITY (c.p.s)	ERROR (%)	COR. VAL. FOR THICKNESS	COR. VAL. FOR POWER	COR. VAL. FOR POSITION
BARE	DUB-41	334.29	40.10	0.17943E 00	0.85	0.60199E-03	0.60199E-06	0.61297E-06
EP	DUB-42	334.19	60.40	0.11451E 00	0.89	0.38428E-03	0.38428E-06	0.41864E-06
1 SUB						0.21771E-03	0.21771E-06	0.19433E-06
CD-R						0.15665E 01	0.15665E 01	0.14642E 01
ROH						0.17651E 01	0.17651E 01	0.21543E 01
BARE	DUB-43	334.01	40.20	0.19444E 00	0.89	0.65277E-03	0.65277E-06	0.66431E-06
EP	DUB-44	333.27	60.30	0.11944E 00	0.99	0.40169E-03	0.40169E-06	0.43705E-06
2 SUB						0.25109E-03	0.25109E-06	0.22726E-06
CD-R						0.16251E 01	0.16251E 01	0.15200E 01
ROH						0.15998E 01	0.15998E 01	0.19232E 01
BARE	DUB-37	336.64	40.10	0.26200E 00	1.04	0.07421E-03	0.87421E-06	0.89015E-06
EP	DUB-38	335.13	60.10	0.15444E 00	1.02	0.51713E-03	0.51713E-06	0.56125E-06
3 SUB						0.35708E-03	0.35708E-06	0.32890E-06
CD-R						0.16905E 01	0.16905E 01	0.15860E 01
ROH						0.14482E 01	0.14482E 01	0.17065E 01
BARE	DUB-39	334.98	39.40	0.25938E 00	1.04	0.86882E-03	0.86882E-06	0.88837E-06
EF	DUB-53	325.94	59.40	0.15200E 00	1.02	0.52015E-03	0.52015E-06	0.55978E-06
3 SUB						0.34868E-03	0.34868E-06	0.32859E-06
CD-R						0.16703E 01	0.16703E 01	0.15870E 01
ROH						0.14918E 01	0.14918E 01	0.17036E 01

Table 3-2-5 Data of ^{238}U- Capture Activities in DU Foils

****** ACTIVATION DATA ******

TITLE : DU CAPTURE & RAH

REACTOR CONDITION : 5SPu- 0% Void- 22.5cm LP

D_2O LEVEL 90.90cm

ITEM RING	FOIL ID	WEIGHT (mg)	HEIGHT (cm)	ACTIVITY (c.p.s)	ERROR (%)	COR. VAL. FOR THICKNESS	COR. VAL. FOR POWER	COR. VAL. FOR POSITION
BARE	DUB2	355.61	39.80	0.18804E 00	0.26	0.60150E-03	0.60150E-06	0.60987E-06
EP	DUB1	356.02	59.30	0.96058E-01	0.17	0.30700E-03	0.30700E-06	0.33739E-06
1 SUB						0.29450E-03	0.29450E-06	0.27248E-06
CD-R						0.19593E 01	0.19593E 01	0.18076E 01
ROH						0.10424E 01	0.10424E 01	0.12382E 01
BARE	DUB4	354.99	39.70	0.21364E 00	0.26	0.68429E-03	0.68429E-06	0.69418E-06
EP	DUB3	355.18	59.20	0.10287E 00	0.20	0.32938E-03	0.32938E-06	0.36149E-06
2 SUB						0.35491E-03	0.35491E-06	0.33269E-06
CD-R						0.20775E 01	0.20775E 01	0.19203E 01
ROH						0.92806E 00	0.92806E 00	0.10866E 01
BARE	DUB6	351.74	39.80	0.26792E 00	0.30	0.86421E-03	0.86421E-06	0.87624E-06
EP	DUB5	354.35	59.40	0.11008E 00	0.20	0.35308E-03	0.35308E-06	0.38857E-06
3 SUB						0.51113E-03	0.51113E-06	0.48767E-06
CD-R						0.24476E 01	0.24476E 01	0.22550E 01
ROH						0.69078E 00	0.69078E 00	0.79680E 00
BARE	DUB8	351.40	39.90	0.26757E 00	0.28	0.86371E-03	0.86371E-06	0.87529E-06
EP	DUB7	351.42	59.50	0.10988E 00	0.24	0.35468E-03	0.35468E-06	0.39088E-06
3 SUB						0.50903E-03	0.50903E-06	0.48441E-06
CD-R						0.24352E 01	0.24352E 01	0.22393E 01
ROH						0.69677E 00	0.69677E 00	0.80693E 00

Table 3-2-6 Data of ^{238}U- Capture Activities in DU Foils

****** ACTIVATION DATA ******

TITLE : DU CAPTURE & RAH

REACTOR CONDITION : 5SPu- 30% Void- 22.5cm LP

D_2O LEVEL 86.70cm

ITEM RING	FOIL ID	WEIGHT (mg)	HEIGHT (cm)	ACTIVITY (c.p.s)	ERROR (%)	COR. VAL. FOR THICKNESS	COR. VAL. FOR POWER	COR. VAL. FOR POSITION
BARE	DUB-62	315.43	40.23	0.21606E 00	0.34	0.75877E-03	0.75877E-06	0.76107E-06
EP	DUB-61	318.01	63.18	0.10591E 00	0.43	0.36955E-03	0.36955E-06	0.46885E-06
1 SUB						0.38922E-03	0.38922E-06	0.29222E-06
CD-R						0.20532E 01	0.20532E 01	0.16233E 01
ROH						0.94947E 00	0.94947E 00	0.16045E 01
BARE	DUB-64	314.77	40.37	0.24247E 00	0.35	0.85294E-03	0.85294E-06	0.85524E-06
EP	DUB-63	314.86	62.70	0.10878E 00	0.29	0.38257E-03	0.38257E-06	0.47963E-06
2 SUB						0.47037E-03	0.47037E-06	0.37561E-06
CD-R						0.22295E 01	0.22295E 01	0.17831E 01
ROH						0.81333E 00	0.81333E 00	0.12769E 01
BARE	DUB-66	314.23	40.56	0.30036E 00	0.35	0.10580E-02	0.10580E-05	0.10604E-05
EP	DUB-65	314.26	62.73	0.11832E 00	0.36	0.41676E-03	0.41676E-06	0.52288E-06
3 SUB						0.64128E-03	0.64128E-06	0.53755E-06
CD-R						0.25387E 01	0.25387E 01	0.20281E 01
ROH						0.64989E 00	0.64989E 00	0.97270E 00
BARE	DUB-68	313.54	40.25	0.30185E 00	0.36	0.10652E-02	0.10652E-05	0.10683E-05
EP	DUB-67	313.39	62.33	0.12120E 00	0.37	0.42783E-03	0.42783E-06	0.53160E-06
3 SUB						0.63733E-03	0.63733E-06	0.53673E-06
CD-R						0.24897E 01	0.24897E 01	0.20096E 01
ROH						0.67128E 00	0.67128E 00	0.99046E 00

Table 3-2-7 Data of ^{238}U- Capture Activities in DU Foils

****** ACTIVATION DATA ******

TITLE : DU CAPTURE & RAH

REACTOR CONDITION : 5SPu- 70% Void- 22.5cm LP

D_2O LEVEL 92.96cm

ITEM RING	FOIL ID	WEIGHT (mg)	HEIGHT (cm)	ACTIVITY (c.p.s)	ERROR (%)	COR. VAL. FOR THICKNESS	COR. VAL. FOR POWER	COR. VAL. FOR POSITION
BARE	DUB-53	325.78	39.80	0.14476E 00	0.98	0.49557E-03	0.49557E-06	0.50314E-06
EP	DUB-54	325.63	59.30	0.89103E-01	1.06	0.30515E-03	0.30515E-06	0.33274E-06
1 SUB						0.19043E-03	0.19043E-06	0.17040E-06
CD-R						0.16241E 01	0.16241E 01	0.15121E 01
ROH						0.16024E 01	0.16024E 01	0.19527E 01
BARE	DUB-55	328.25	39.90	0.16127E 00	0.84	0.54881E-03	0.54881E-06	0.55690E-06
EP	DUB-56	325.43	59.40	0.89923E-01	0.72	0.30810E-03	0.30810E-06	0.33640E-06
2 SUB						0.24071E-03	0.24071E-06	0.22050E-06
CD-R						0.17813E 01	0.17813E 01	0.16555E 01
ROH						0.12800E 01	0.12800E 01	0.15257E 01
BARE	DUB-75	308.23	39.80	0.19624E 00	0.79	0.70198E-03	0.70198E-06	0.71269E-06
EP	DUB-76	308.52	59.40	0.95737E-01	0.72	0.34221E-03	0.34221E-06	0.37364E-06
3 SUB						0.35977E-03	0.35977E-06	0.33905E-06
CD-R						0.20513E 01	0.20513E 01	0.19074E 01
ROH						0.95119E 00	0.95119E 00	0.11020E 01
BARE	DUB-79	307.92	39.40	0.19220E 00	0.42	0.68809E-03	0.68809E-06	0.70011E-06
EP	DUB-80	307.27	59.80	0.93856E-01	0.70	0.33658E-03	0.33658E-06	0.36946E-06
3 SUB						0.35151E-03	0.35151E-06	0.33065E-06
CD-R						0.20444E 01	0.20444E 01	0.18950E 01
ROH						0.95752E 00	0.95752E 00	0.11174E 01

Table 3-2-8-1 Data of ^{238}U- Capture Activities in DU Foils

****** ACTIVATION DATA ******

TITLE : DU CAPTURE & RAH (EXP 1)

REACTOR CONDITION : 5SPu- 100% Void- 22.5cm LP

D_2O LEVEL 103.44cm

ITEM RING	FOIL ID	WEIGHT (mg)	HEIGHT (cm)	ACTIVITY (c.p.s)	ERROR (%)	COR. VAL. FOR THICKNESS	COR. VAL. FOR POWER	COR. VAL. FOR POSITION
BARE	DUB31	336.93	39.30	0.64707E-01	0.18	0.21576E-03	0.21576E-06	0.22972E-06
EP	DUB32	336.47	58.60	0.40676E-01	0.19	0.13578E-03	0.13578E-06	0.13830E-06
1 SUB						0.79988E-04	0.79988E-07	0.91420E-07
CD-R						0.15891E 01	0.15891E 01	0.16610E 01
ROH						0.16975E 01	0.16975E 01	0.15129E 01
BARE	DUB33	336.89	40.80	0.70792E-01	0.12	0.23608E-03	0.23608E-06	0.24776E-06
EP	DUB34	336.09	60.30	0.41951E-01	0.15	0.14016E-03	0.14016E-06	0.14427E-06
2 SUB						0.95918E-04	0.95918E-07	0.10349E-06
CD-R						0.16844E 01	0.16844E 01	0.17174E 01
ROH						0.14612E 01	0.14612E 01	0.13940E 01
BARE	DUB35	334.64	39.70	0.88483E-01	0.14	0.29661E-03	0.29661E-06	0.31453E-06
EP	DUB36	336.67	59.20	0.52792E-01	0.23	0.17614E-03	0.17614E-06	0.18003E-06
3 SUB						0.12047E-03	0.12047E-06	0.13450E-06
CD-R						0.16840E 01	0.16840E 01	0.17471E 01
ROH						0.14621E 01	0.14621E 01	0.13385E 01
BARE	DUB37	336.28	39.80	0.88920E-01	0.11	0.29695E-03	0.29695E-06	0.31458E-06
EP	DUB38	333.53	59.30	0.51015E-01	0.07	0.17146E-03	0.17146E-06	0.17535E-06
3 SUB						0.12549E-03	0.12549E-06	0.13922E-06
CD-R						0.17319E 01	0.17319E 01	0.17940E 01
ROH						0.13663E 01	0.13663E 01	0.12595E 01

Table 3-2-8-2 Data of ^{238}U- Capture Activities in DU Foils

****** ACTIVATION DATA ******

TITLE : DU CAPTURE & RAH (EXP 2)

REACTOR CONDITION : 5SPu- 100% Void- 22.5cm LP

D_2O LEVEL 103.44cm

ITEM RING	FOIL ID	WEIGHT (mg)	HEIGHT (cm)	ACTIVITY (c.p.s)	ERROR (%)	COR. VAL. FOR THICKNESS	COR. VAL. FOR POWER	COR. VAL. FOR POSITION	
BARE	DUB41	334.46	39.80	0.62888E-01	0.19	0.21090E-03	0.21090E-06	0.22342E-06	
EP	DUB42	334.37	59.40	0.39260E-01	0.24	0.13169E-03	0.13169E-06	0.13477E-06	
1 SUB						0.79210E-04	0.79210E-07	0.88659E-07	
CD-R						0.16015E 01	0.16015E 01	0.16579E 01	
ROH						0.16626E 01	0.16626E 01	0.15200E 01	
BARE	DUB43	334.24	39.30	0.67029E-01	0.12	0.22491E-03	0.22491E-06	0.23946E-06	
EP	DUB44	333.36	59.70	0.40724E-01	0.16	0.13693E-03	0.13693E-06	0.14038E-06	
2 SUB						0.87982E-04	0.87982E-07	0.99077E-07	
CD-R						0.16426E 01	0.16426E 01	0.17058E 01	
ROH						0.15563E 01	0.15563E 01	0.14169E 01	
BARE	DUB45	333.37	39.90	0.86575E-01	0.11	0.29108E-03	0.29108E-06	0.30806E-06	
EP	DUB46	332.18	59.50	0.50424E-01	0.19	0.17001E-03	0.17001E-06	0.17408E-06	
3 SUB						0.12107E-03	0.12107E-06	0.13398E-06	
CD-R						0.17121E 01	0.17121E 01	0.17696E 01	
ROH						0.14042E 01	0.14042E-01	0.12994E 01	
BARE	DUB77	312.54	39.30	0.83236E-01	0.16	0.29446E-03	0.29446E-06	0.31351E-06	
EP	DUB78	308.21	59.80	0.46882E-01	0.13	0.16771E-03	0.16771E-06	0.17206E-06	
3 SUB						0.12675E-03	0.12675E-06	0.14146E-06	*1
CD-R						0.17558E 01	0.17558E 01	0.18222E 01	
ROH						0.13232E 01	0.13232E 01	0.12163E 01	

*1 not adopted because of foil miss-alignment

Table 3-3-1 Epi-and Sub-Cadmium Reaction Rate of Depleted Uranium Foils and Resonance Capture Ratioes ρ^{28} in 22.5cm Pitch Lattice as a Function of Fuel Pin Position

Item \ Lattice condition / Fuel pin / Position		8R Pu-0 % Void-22.5 cm LP	8R Pu-100 % Void-22.5 cm LP	8S Pu-0 % Void-22.5 cm LP	8S Pu-100 % Void-22.5 cm LP
Sub-Cd Reaction Rate of DU	1st	1.00	1.00	1.00	1.00
	2nd	1.34	1.25	1.29	1.18
	3rd	2.02	1.66	1.94	1.73
Epi-Cd Reaction Rate of DU	1st	1.00	1.00	1.00	1.00
	2nd	1.04	1.04	1.03	1.04
	3rd	1.14	1.34	1.11	1.34
Resonance capture ratio ρ^{28}*	1st	1.69	2.42	1.90	2.54
	2nd	1.31	2.00	1.52	2.23
	3rd	0.951	1.96	1.09	1.96
	cell	1.10	2.02	1.26	2.08

* Corrected to the condition of no flux distortion due to Cd-cover.
(Correction factor of 1.05 was adopted for Cd-ratio)

Table 3-3-2 Epi-and Sub-Cadmium Activities of Depleted Uranium Foils and Resonance Capture Ratioes ρ^{28} in 22.5cm Pitch Lattice as a Function of Fuel Pin Position

Item \ Lattice condition / Fuel pin Position		5S Pu 0 % Void 22.5 cm LP	5S Pu 30 % Void 22.5 cm LP	5S Pu 70 % Void 22.5 cm LP	5S Pu 100 % Void 22.5 cm LP
Sub-Cd Reaction Rate of DU	1st	1.00	1.00	1.00	1.00
	2nd	1.31	1.34	1.21	1.29
	3rd	1.96	2.03	1.61	2.00
Epi-Cd Reaction Rate of DU	1st	1.00	1.00	1.00	1.00
	2nd	1.02	1.03	1.01	1.06
	3rd	1.07	1.11	1.27	1.12
Resonance Capture ratio ρ^{28}*	1st	1.39	1.83	2.27	1.72
	2nd	1.21	1.43	1.73	1.59
	3rd	0.877	1.08	1.23	1.43
	cell	1.00	1.23	1.43	1.50

* Corrected to the condition of no flux distortion due to Cd-cover.

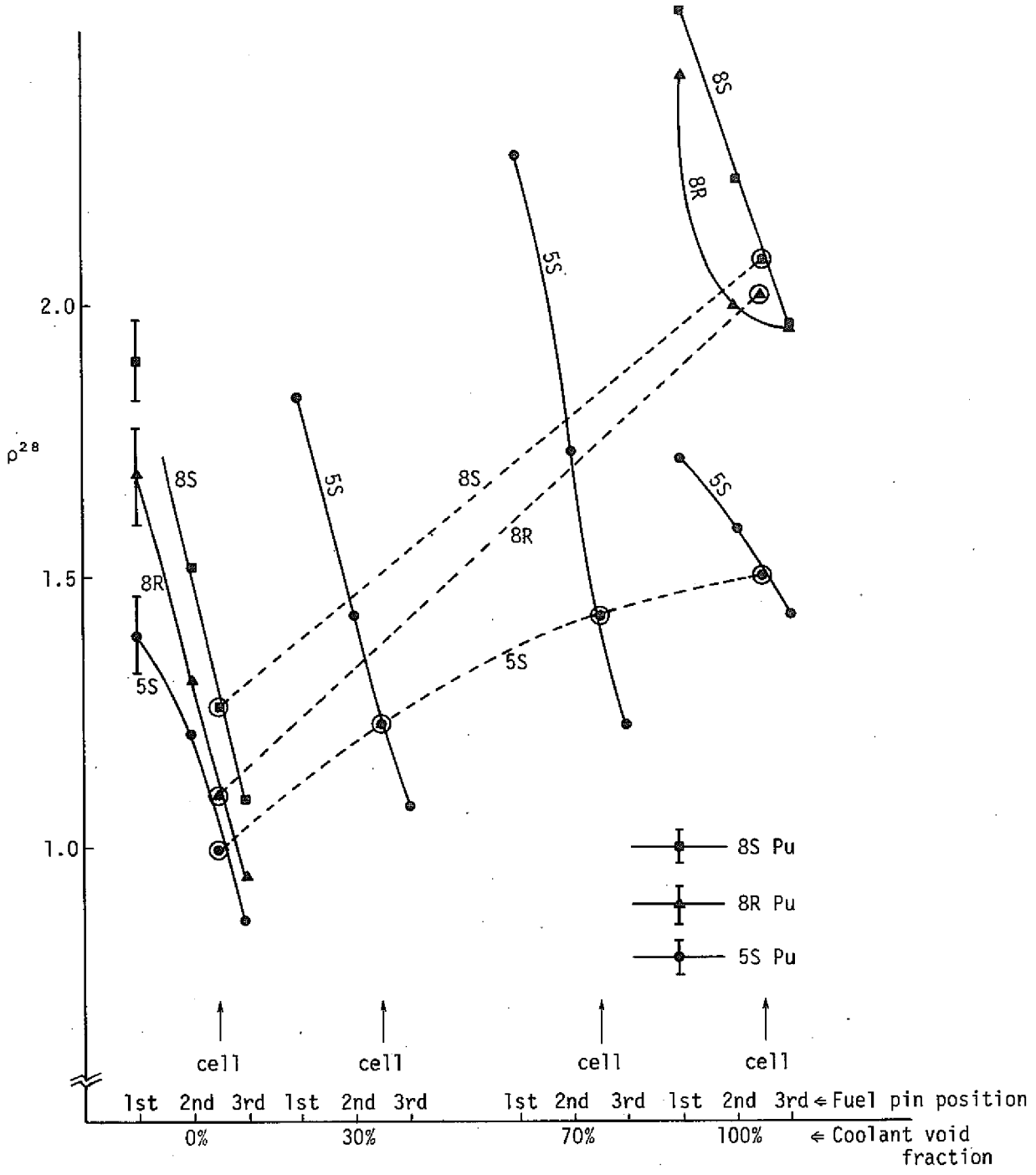


Fig. 3-1 ρ^{28} as Functions of Coolant Void Fraction, Plutonium Fuel Enrichment and Pin Position in the Cluster.