

SMART

가

**Evaluation of Daily Load Follow Operation Capability of SMART Core
with Coolant Outlet Temperature Control**

150

SMART
가
5%, 6%
60
30000 m
7600 m 14100 m
50% 25%
가 SMART 가 15%
가 50% 25%

Abstract

During the load follow operation, SMART uses the coolant outlet temperature control as the base load operation. The local peak power can be increased due to the variation of xenon distributions by the load follow operation, and it thus reduces the core thermal margin. Quantitative estimations for various load follow scenarios showed that the reduction of thermal margin was 5% and 6% for load follows of 50% and 25% low power levels, respectively. These results imply that the reduction of thermal margins are small enough in comparison with 15% thermal margin target of SMART core design. Durability requirements of the control element drive mechanism assuming the load follow operation during whole 60 years of plant life time were estimated by 7600 m and 14100 m for load follows of 50% and 25% low power levels, respectively. These are far less than 30000 m of a typical requirement for the control element drive mechanism of a commercial pressurized water reactor.

I.

330 MW SMART^[1, 2]

가 SMART
가 ±3°C 가
가 가^[3] SMART
-40 ~ -60 pcm/°C 가

가

3 가 가
3 가

2 가 SMART
+0.30 (AO)^[4] AO
가 SMART

CASMO-3/MASTER

^[5, 6, 7] Xenon

II. SMART

SMART 57 17×17 가 4.95 w/o U²³⁵ UO₂
A, B, C 가
1 2 R4, R3, R2, R1 4
가 R4, R3, R2 3 가 60 cm
3
SMART

4

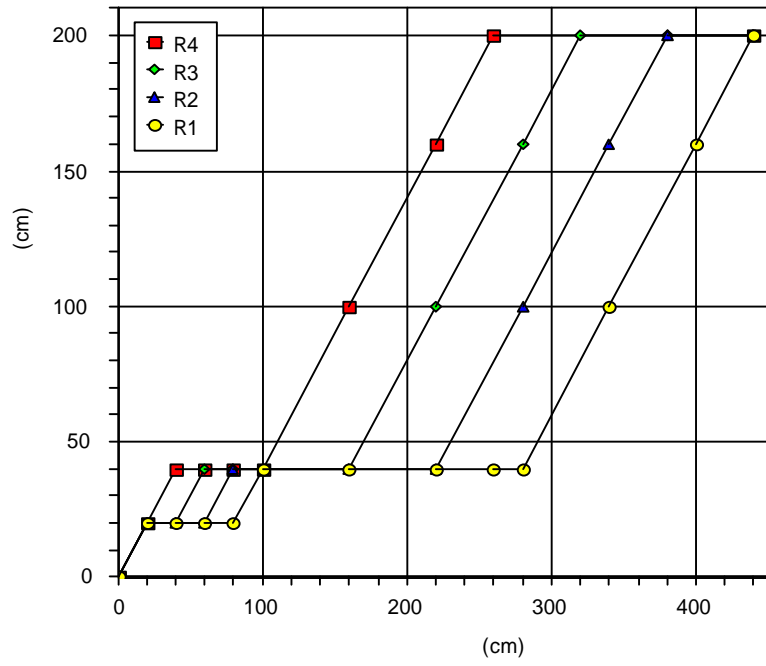
T_{set} , T_{max} , T_{min} 5
±3°C SMART 6 SMART

			A	B	A			
			B	B	B	B	B	
		B	B	C	C	C	B	B
A	B	C	C	C	C	C	B	A
B	B	C	C	C	C	C	B	B
A	B	C	C	C	C	C	B	A
		B	B	C	C	C	B	B
			B	B	B	B	B	
			A	B	A			

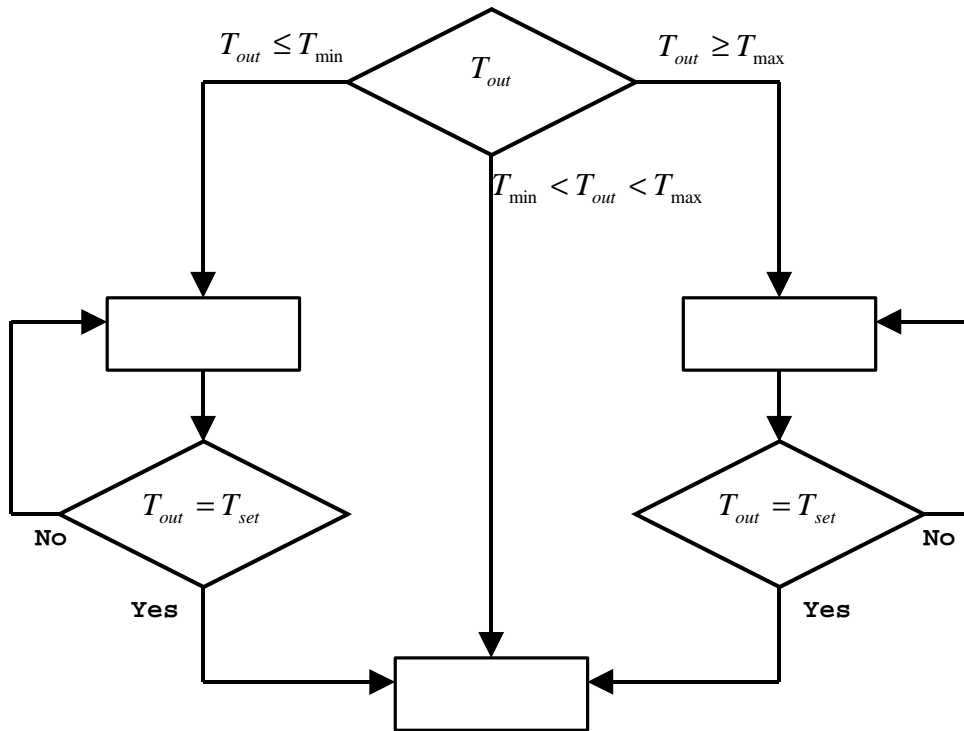
1. SMART

				R1				
			R1	R1	R1	R1	R1	
		R1	R1	R2	R2	R2	R1	R1
	R1	R2	R3	R4	R3	R2	R1	
R1	R1	R2	R4	R4	R4	R2	R1	R1
	R1	R2	R3	R4	R3	R2	R1	
		R1	R1	R2	R2	R2	R1	R1
			R1	R1	R1	R1	R1	
				R1				

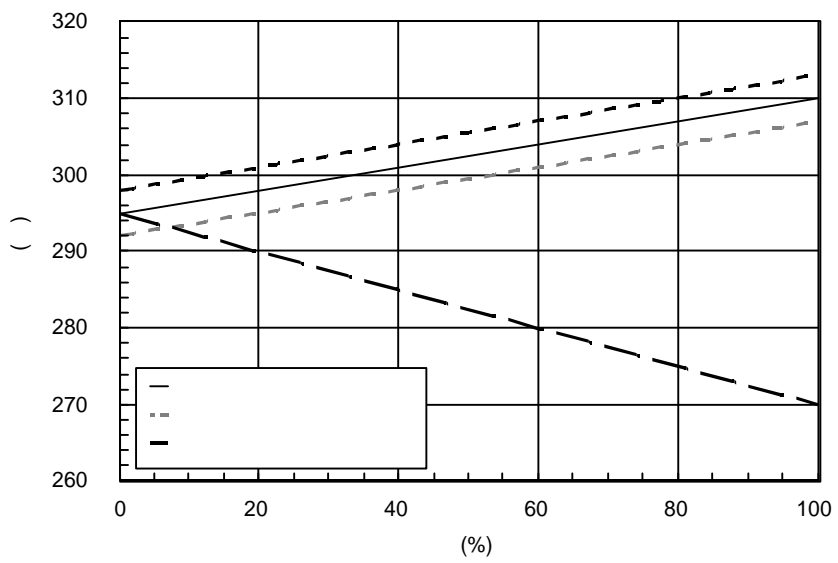
2. SMART



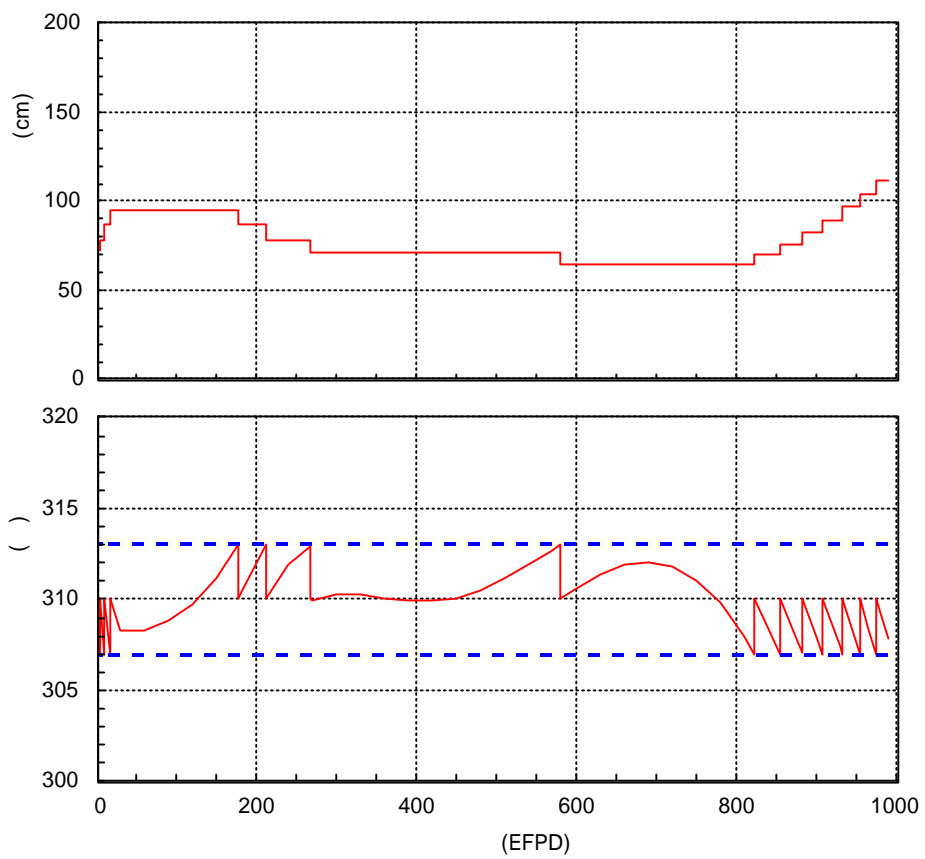
3. SMART



4.



5. SMART



6 50% 가 .
 12-3-6-3, 14-2-6-2, 16-1-6-1 가
 3 2 .
 xenon 가 ,
 MASTER 가
 1 50% 12-3-6-3, 14-2-6-2, 16-1-6-1 가
 MOC 가 가 가 3 가 630 EFPD
 3 가 5% , 2
 1% 가
 5% 가
 0.30 0.10
 가 7 8 3 가
 가 12-3-6-3 가 16-1-6-1
 2 25% . 25%
 가 50% 3
 가 12-3-6-3 가 16-1-6-1
 25% 3 2
 가 5.71 % 2.46 % 가 8.5
 64.3 cm 가 . 9 10 25%

III.

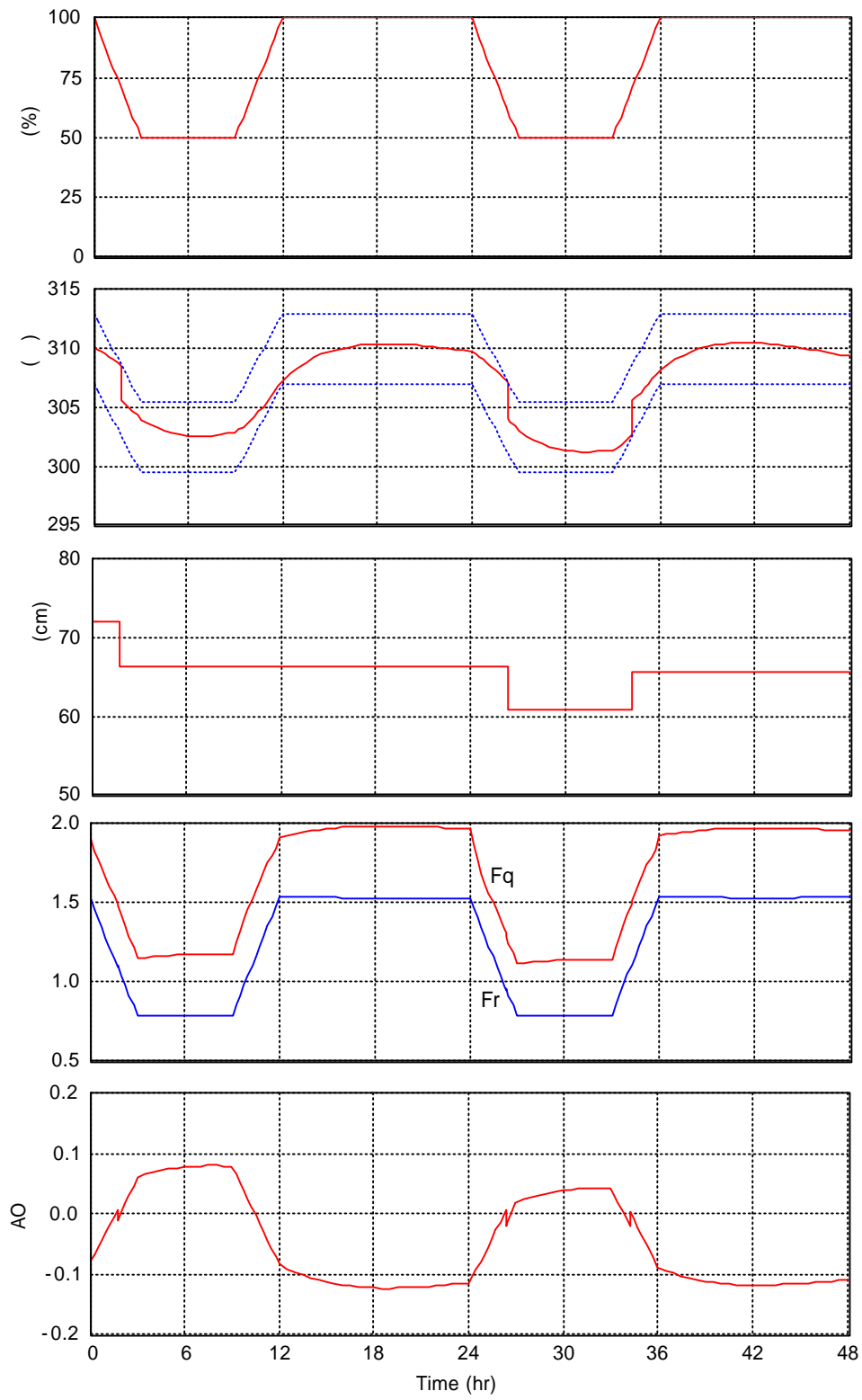
SMART 가 3 2
 3 가 50%
 4.55%, 25% 5.71% 가 2
 50% 0.92%, 25% 2.46% 가 ,
 (AO) 0.30
 15% SMART

1. 50%

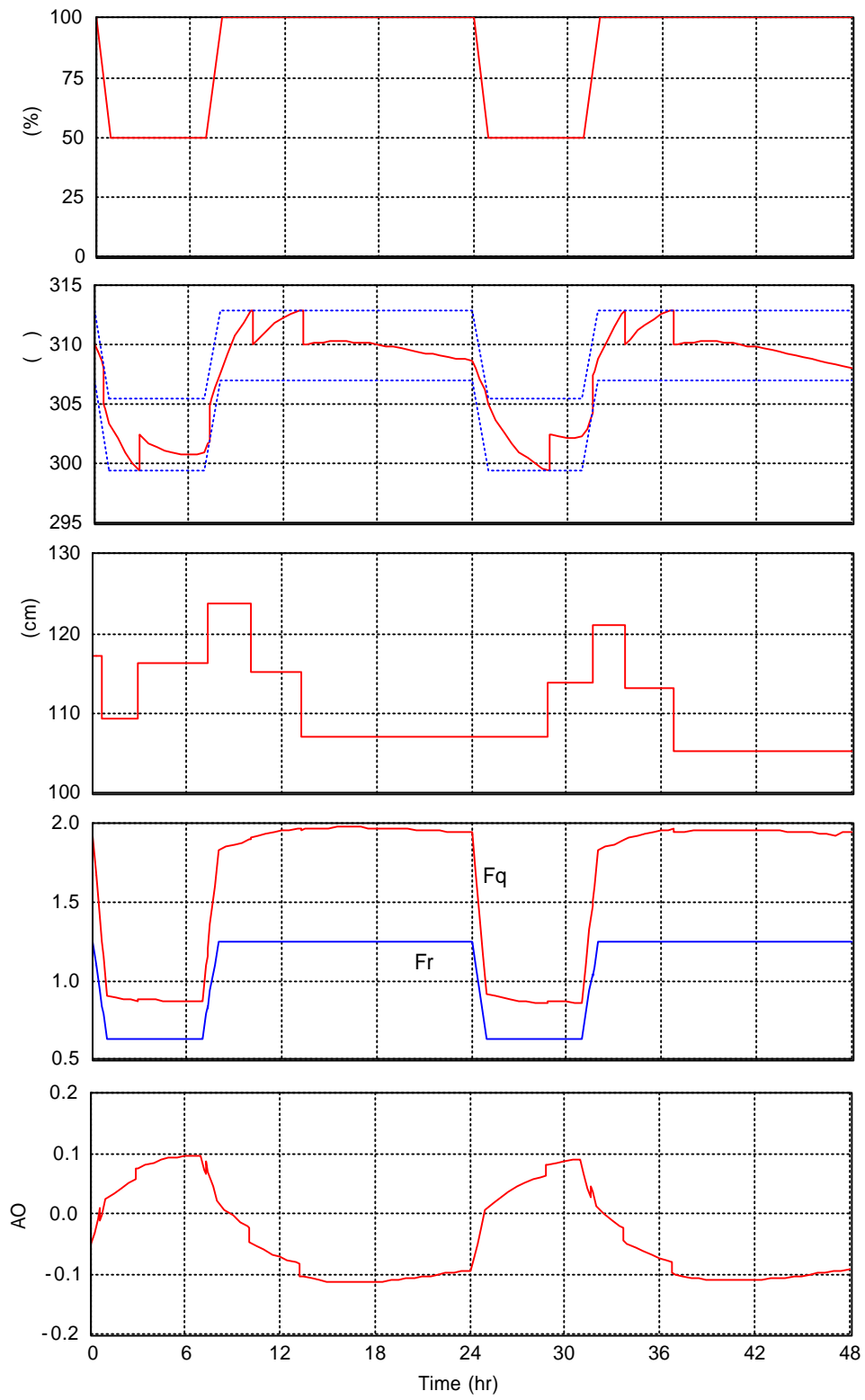
		가 (%)		AO		
		Fq	Fr		(/)	(cm/)
12-3-6-3	BOC	4.55	0.92	0.0807	1.5	8.0
	MOC	4.21	0.87	-0.0521	1.5	8.7
	EOC	3.65	0.21	0.1000	0.5	4.2
14-2-6-2	BOC	2.16	0.26	0.0789	3.0	17.0
	MOC	4.31	0.92	-0.0549	3.5	20.5
	EOC	3.35	0.21	0.1007	1.5	11.5
16-1-6-1	BOC	2.75	0.44	0.0812	3.0	16.2
	MOC	1.58	0.24	-0.0590	5.5	29.2
	EOC	1.16	0.29	0.0981	4.5	34.6
		4.55	0.92	0.1007	5.5	34.6

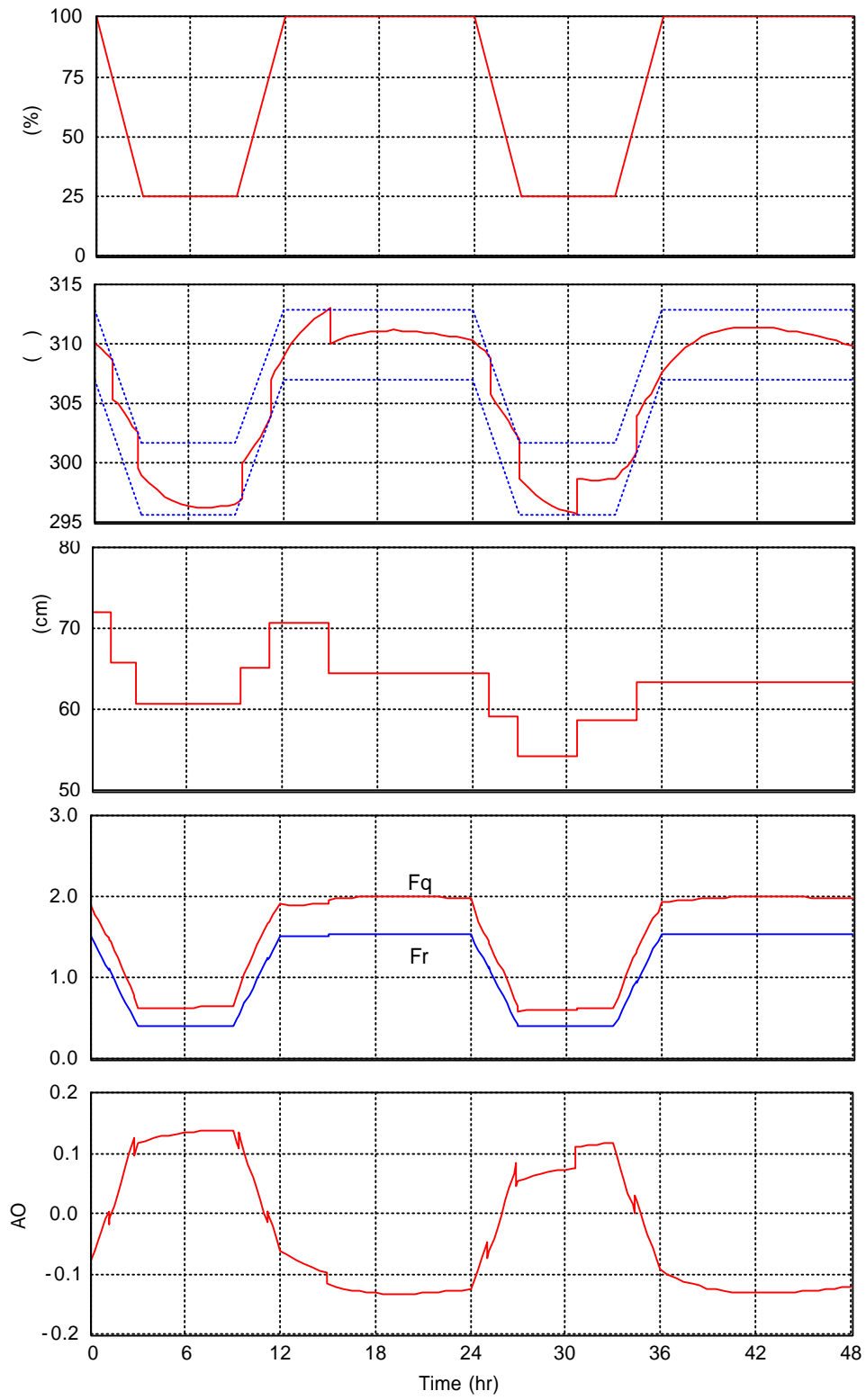
2. 25%

		가 (%)		AO		
		Fq	Fr		(/)	(cm/)
12-3-6-3	BOC	5.71	1.19	0.1384	4.5	23.4
16-1-6-1	EOC	3.41	2.46	0.2020	8.5	64.3

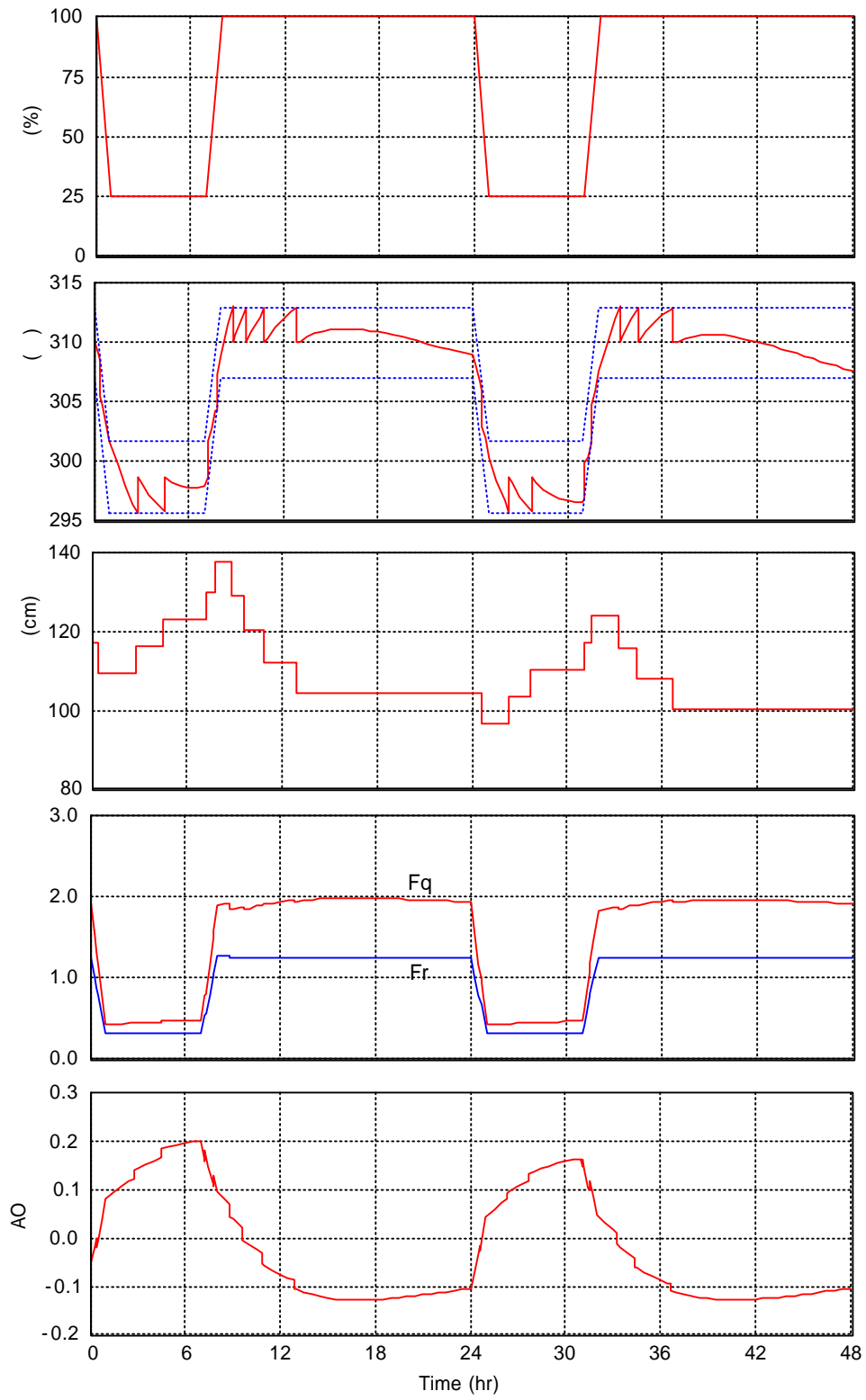


7. 50% 12-3-6-3





9. 25% 12-3-6-3



10. 25% 16-1-6-1

가

1

1 50% 34.6 cm/ , 25%

64.3 cm/ . 60 SMART

가 50% 25%

7600 m 14100 m .

SMART 15%

1 25%

가 . 30000 m [8]

60

가 .

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