AN ENLARGED 2-D OECD/NEA C5G7 BENCHMARK PROBLEM AND TWO-LEVEL p-CMFD SOLUTIONS

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1. PROBLEM

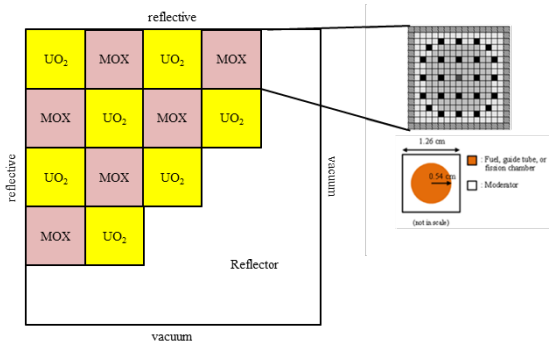

Fig. 1. Geometry of test problem.

2. TL(N)/p-CMFD SOLUTIONS VIA CRX-3 CODE [1, 2]

Table Ⅰ. Results of Enlarged 2-D C5G7 (5 by 5) Benchmark Problem

Methods	No Acc.	p-CMFD	TL(1)/p-CMFD			TL(4)/p-CMFD		
	*a**	*a**	*a**	*b**	*c**	*a**	*b**	*c**
k_{eff}	1.23141	1.23141	1.23141	1.23141	1.23141	1.23141	1.23141	1.23141
Number of transport sweep iterations	2241	438	48	48	49	18	18	18
Number of p-CMFD Power (or JFNK) Iterations	0	4584	895	893	646	1023	1023	742
Transport sweep calculation time (sec)†	19874.194	3852.734	424.896	433.586	432.902	159.347	159.241	158.804
Whole-core p-IMFD time (sec)	0	0	23.143	13.831	8.467	8.203	5.515	3.536
Local p-IMFD time (sec)	0	0	19.212	12.682	9.307	25.41	18.688	11.893
Whole-core p-CMFD time (sec)	0	38.363	4.177	4.308	4.765	6.353	6.333	6.91
Total calculation time (sec)	19874.33	3891.21	471.662	464.529	455.566	199.425	189.887	181.254
Speedup	1	5.11	42.14	42.78	43.63	99.66	104.66	109.65
Percentage of transport sweep time in total calculation time	100.0	99.01	90.08	93.34	95.03	79.90	83.86	87.61

a: Gauss-Seidel +Power Iteration, b*: BiCGSTAB +Power Iteration, c*: BiCGSTAB +JFNK*

†*: a single thread of a CPU (Intel i7-7700K)*

[1] Personal Communications with S. Yuk of Korea Atomic Energy Research Institute.
[2] S. Yuk and N. Z. Cho, "User's Manual for the Method of Characteristics Computer Code Package CRX3 Version 1.0," KAIST Internal Report NURAPT-2017-01, February 2017.