Specification of the OPR2D problem

The OPR2D problem represents the hot-zero-power state of a OPR1000 (Optimized Power Reactor 1000) like reactor which is characterized by the use of the Combustion Engineering type fuel assemblies having large water holes. There are five types of 16x16 fuel assemblies as defined in Fig. 1 and 177 fuel assemblies are loaded into the core as shown in Fig. 2. The water hole region and the reflector region in the core are model with water only. Each pin cell consists of a fuel pellet, cladding, and coolant. No fuel air gap or assembly water gap is modeled for simplicity. The pin cell configuration is given in Fig. 3 and the material compositions are given in Table 1. The temperature is 296℃ across the core.

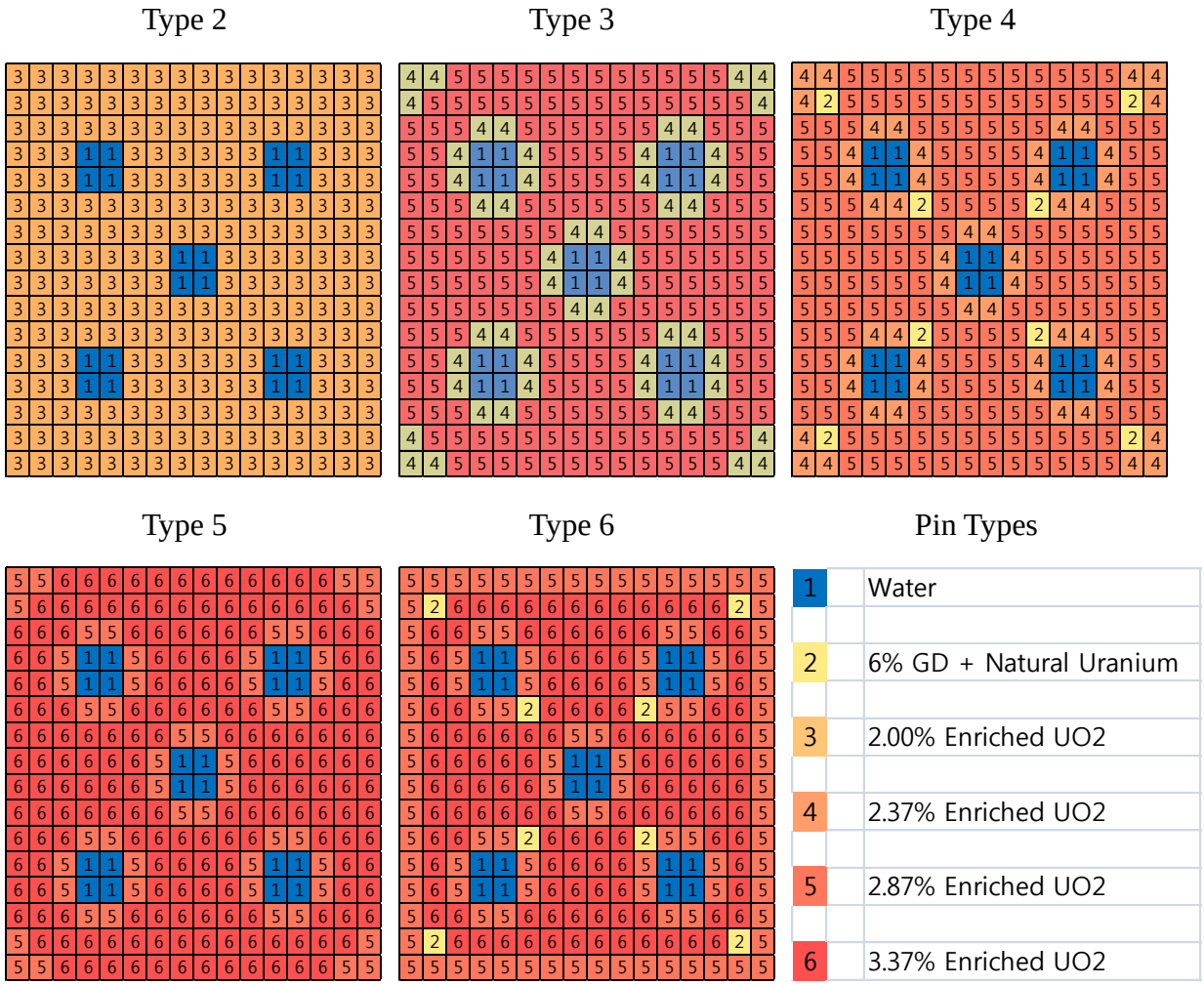

Figure 1. Fuel Assembly Types

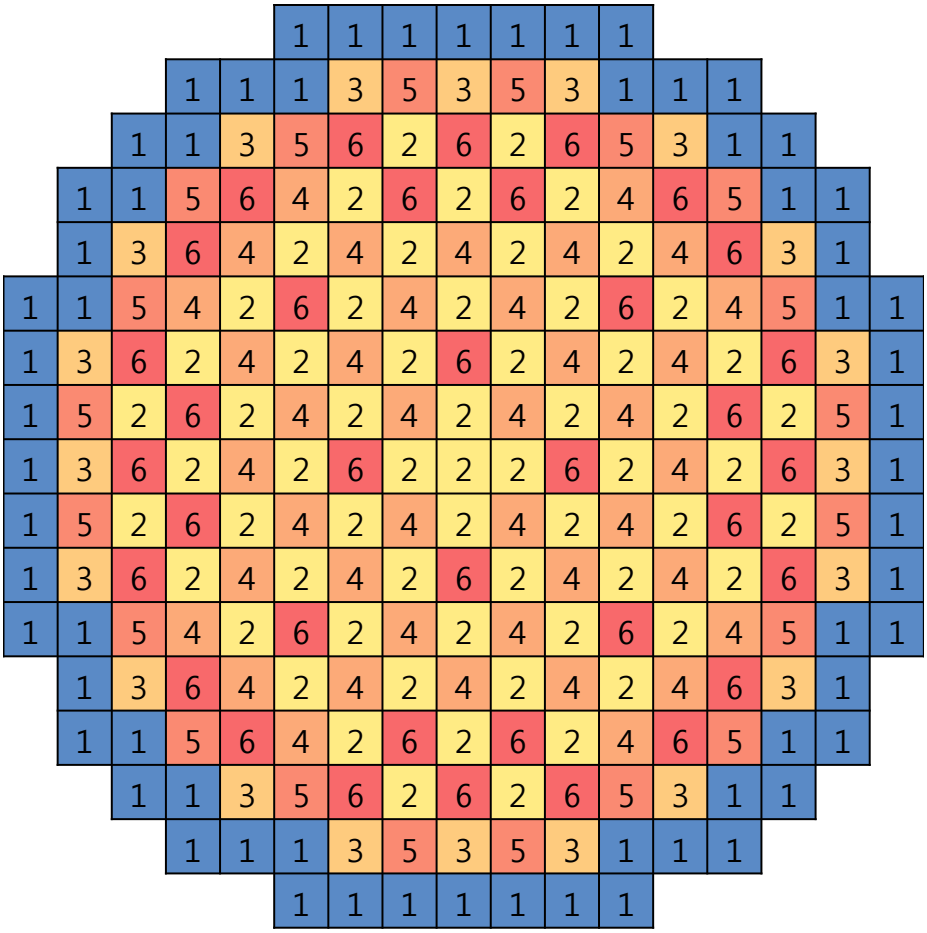

Figure 2. Core Configuration

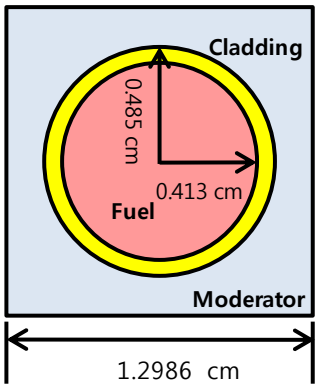

Figure 3. Fuel Pin Configuration

Table 1. Material Compositions

Material	Density (g/cc)	Nuclide	Weight %
UO2 2.0%	10.24	92235	1.76308
		92238	86.39082
		8016	11.84610
UO2 2.37%	10.24	92235	2.08924
		92238	86.06417
		8016	11.84660
UO2 2.87%	10.24	92235	2.52998
		92238	85.62275
		8016	11.84726
UO2 3.37%	10.24	92235	2.97072
		92238	85.18134
		8016	11.84793
6%GD+NU	10.24	92235	0.58918
		92238	82.27710
		64152	0.01006
		64154	0.11109
		64155	0.75907
		64156	1.05664
		64157	0.81303
		64158	1.29868
		64160	1.15737
		8016	11.92779
Cladding	6.55	40000	0.04244*
Water	0.735	1001	11.18000
		8016	88.72000
		5010	0.02000
		5011	0.08000

*Number density for natural Zr given in atoms 1/(barn-cm)