OECD/NEA Source Convergence Benchmark 3: Three thick one-dimensional slabs

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Overview

This benchmark problem is composed of one-dimensional infinite slab geometry as shown in Figure 1. A slab of water separates two fissile units. Atom densities of the fissile material and water are given in Table 1. The thickness of unit 1 is fixed at 35 cm. The thickness of unit 2 and water layer are variable as shown if Table 2.

Specifications

Material data

The material compositions are as follows (in atoms/barn.cm):

Uranyl Solution	
H	5.9347E-02
N	2.1220E-03
O	3.7258E-02
U235	7.6864E-05
U238	6.8303E-04
Water	
H	6.6658E-02
O	3.3329E-02

Table 1

Geometry data

The following figure describes the problem geometry. Unit 1 and unit 2 have the same composition (see table above), the difference between fissile units being the thickness. Table 2 gives the thicknesses for the studied cases.

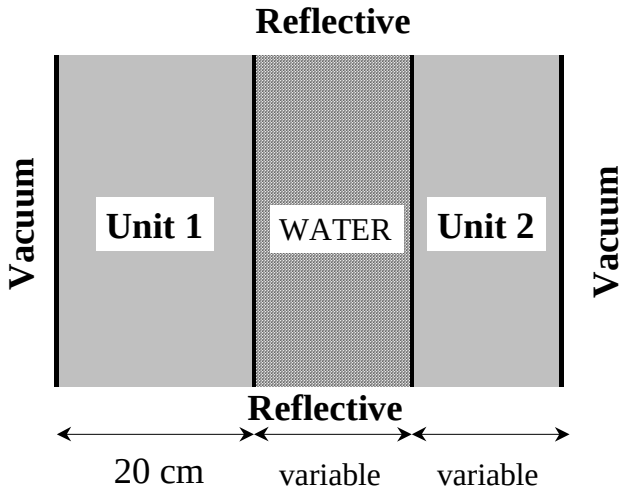

Figure 1 Configuration of coupling array

Case number	Thickness of unit 1 (cm)	Thickness of unit 2 (cm)	Water thickeness (cm)
1	20cm	20cm	30
2	20cm	18cm	30
3	20cm	15cm	30
4	20cm	12cm	30
5	20cm	20cm	20
6	20cm	18cm	20
7	20cm	15cm	20
8	20cm	12cm	20
9	20cm	20cm	10
10	20cm	18cm	10
11	20cm	15cm	10
12	20cm	12cm	10

Table 2

Required calculations

Calculations should be performed using the following parameters:

2000 neutrons per generation

50 generations skipped before tallying

550 active generations

Initial source distribution: flat.

Required output

The following information is required. The proposed submission format is intended to make the analysis phase easier. MS Excel spreadsheets may be used to enter the data. However, when a simple text file is used, numerical data separator should be "," without blanks and the word NODATA is to be inserted if a field is empty.
 ("

Line	Required information
1:	Date
2:	Institution
3:	Contact Person
4:	e-mail address
5:	Voice phone number
6:	FAX Phone Number
7:	Problem name, e.g., "Benchmark 1: Checkerboard storage"
8:	Case name, e.g., 1
9:	Code name
10:	Code type, e.g., Monte Carlo, SN
11:	Cross section library source, e.g., JEF-2.2
12:	Starting source
13:	nskip = number of generations skipped before beginning tallies or before convergence:
14:	ngen = number of generations tallied
15:	nhist = number of histories per generation
16:	ngensh = number of generations per superhistory
17:	final k-eff estimate
18:	final k-eff estimate uncertainty (one standard deviation)
19:	k-eff estimate for first supergeneration
20:	individual k-eff estimate for second supergeneration
18+ngen:	individual k-eff estimate for last supergeneration

Cumulative fission fractions " ff(i,g)" in fissionable region "i" in generation g, is also an important output. As all computer codes do not have the capability of printing this information for any generation, participants may choose between the following alternatives.

1) Fission fractions are given as average over all generations

2) Fission fractions are given as average over all active generations

3) Fission fractions are given at different generation sequences