OAK RIDGE National Laboratory

MAVRIC Cask Analysis with ORIGEN Spent Fuel Sources

2018 SCALE Users' Group Tutorial

K. Banerjee
C. Celik
W. Wieselquist

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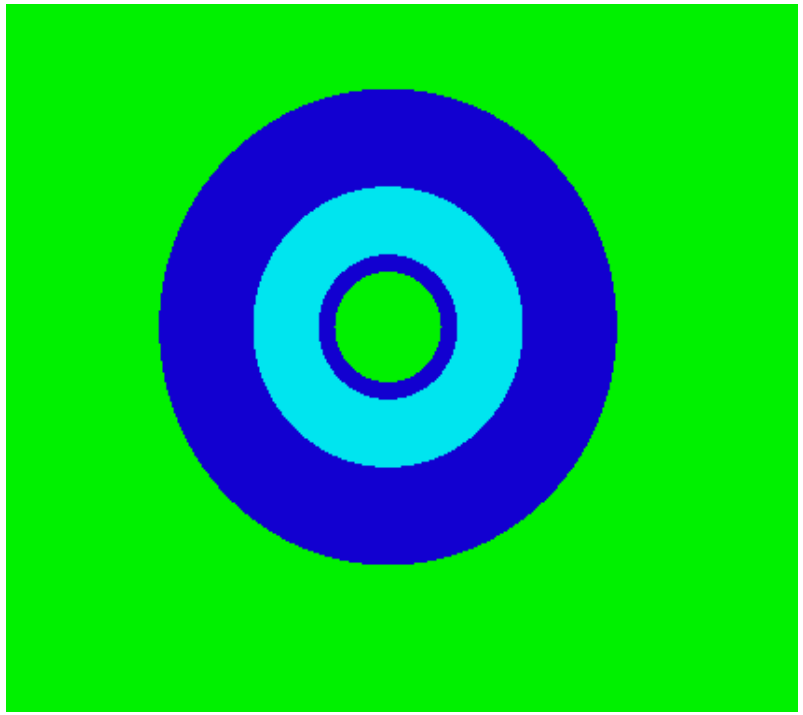
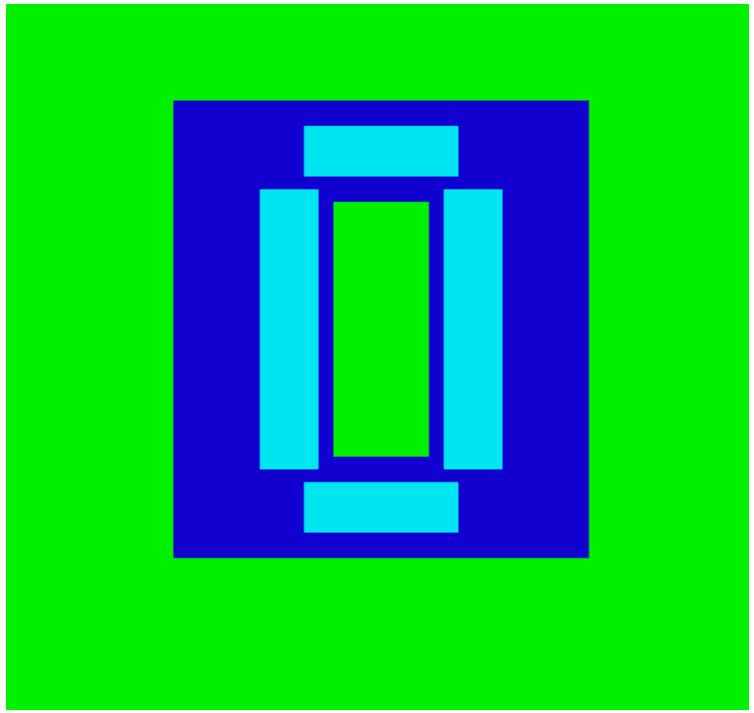
Objectives

- Review various input blocks used in MAVRIC input files
- Modify/add required parameters and run MAVRIC input files
- Perform radiation source calculation
- Use the binary source file (.f71) created by ORIGAMI directly inside MAVRIC
- Examine results using the Fulcrum graphical user interface

Problem 1

- Cobalt source shielded by Tungsten and stainless steel





Problem 1 tasks

- Open test_prob1_mavric.inp in Fulcrum
- Examine all the blocks to understand the input structure and parameters
- Go to the response block and add the required response number
- Add distribution number to the source block
- Add response number and grid geometry id to the tally block
- Add grid geometry number in the importance map block
- respWeighting in the importance map block is for FW-CADIS

Problem 1 tasks (cont.)

- Run the modified/updated test_prob1_mavric.inp
- Examine the following using Fulcrum
  - Denovo forward flux
  - Denovo adjoint flux
  - Importance map
  - Dose map

Problem 2

- Same as problem 1 with the following differences
  - Spent nuclear fuel source instead of Co-60 (need to generate the source terms)
  - Direct use of source distribution from the binary file (.f71) generated by ORIGAMI

Problem 2 tasks

- Add 5 years of cooling time in ORIGAMI
  - What is the burnup of the assembly?
- Copy the *.f71 file to a desired location on your computer
- Use an =shell before =mavric to copy the *.f71 file to the working directory as src.f71 (name not important)
- In definition block
  - Add source file name (e.g. src.f71) in distribution

Problem 2 tasks (cont.)

- Run the modified/updated test_prob1_mavric.inp
- Examine the following using Fulcrum
  - Denovo forward flux
  - Denovo adjoint flux
  - Importance map
  - Dose map

Summary

- MAVRIC has a very nice feature to create sources from ORIGEN neutron or gamma emission spectra on *.f71 files
- *.f71 files for spent fuel can be created with ORIGAMI
- Fulcrum has many visualization options for both the *.f71 and MAVRIC output