Crash Course OpenMC Overview

Info

Location: EB 100 (Club Commons)

Time: 7:00 – 8:30 Tuesdays (Oct 28 – Nov 25)

Contact: willm412@byu.edu

Structure

5 week – Once a Week Crash Course in OpenMC

Each week is a mix of:

1. Explanation of Theory
2. Explanation of Application/Syntax
3. Skills Practice

Everything is hosted on GitHub: https://github.com/williamhm412/crash_course_openmc

After 5 weeks anyone who would like to will collaborate on a group project where we will use our skills to create something to present at a student conference or something similar.

Skills Covered:

- Materials
- Surfaces
- Cells
- Boundary Conditions
- Sources
- Universes (very basic)
- Pincell Creation
- Settings
- Visualization
- Molten Salt Reactor Creation
- Tallies
- Depletion

Theory Covered:

- Constructive Solid Geometry (CSG)
- Particle Transport (surface tracking, Random numbers, random walk)
- k_{eff} calculations
- Active cycles/particles
- Shannon Entropy/inactive cycles
- Cross Sections (continuous energy, and multi group)
- Thermal Scattering Laws
- P tables (unresolved resonance range)
- Flux and other tallies
- Depletion
- Parallelization
- Applications of Monte Carlo Methods

Week 1 - Intro / Install

- ➔ WSL
- ➔ GitHub
- ➔ Python
- ➔ Jupyter Notebook
- ➔ OpenMC Packages

Week 2 – Elements of a model / Monte Carlo Background

Theory

- ➔ Constructive Solid Geometry (CSG)
- ➔ Particle Transport (surface tracking, Random numbers, random walk)
- ➔ Active cycles/particles
- ➔ Shannon Entropy/inactive cycles
- ➔ keff calculations

Skills

- ➔ Materials
- ➔ Surfaces
- ➔ Cells
- ➔ Boundary Conditions
- ➔ Sources

Week 3 – Basic Model / Cross Sections

- ➔ Catch-Up From Week 2

Theory

- ➔ Active cycles/particles
- ➔ Shannon Entropy/inactive cycles
- ➔ Cross Sections (continuous energy, and multi group)
- ➔ Thermal Scattering Laws

Skills

- ➔ Universes (very basic)
- ➔ Settings
- ➔ Pincell Creation

Week 4 – Visualization & Start Advanced Reactor / Monte Carlo Calculations

Theory

- ➔ P tables (unresolved resonance range)
- ➔ Flux and other tallies
- ➔ Depletion

Skills

- ➔ Visualization
- ➔ Start Molten Salt Reactor Creation

Week 5 – Finish Advanced Reactor / Monte Carlo Advantages and Disadvantages

Theory

- ➔ Parallelization
- ➔ Applications of Monte Carlo Methods

Skills

- ➔ Finish Molten Salt Reactor Creation
- ➔ Tallies
- ➔ Depletion