Numerical Experiments for validating Non-Optimizing algorithms Report

Draft 1

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Introduction

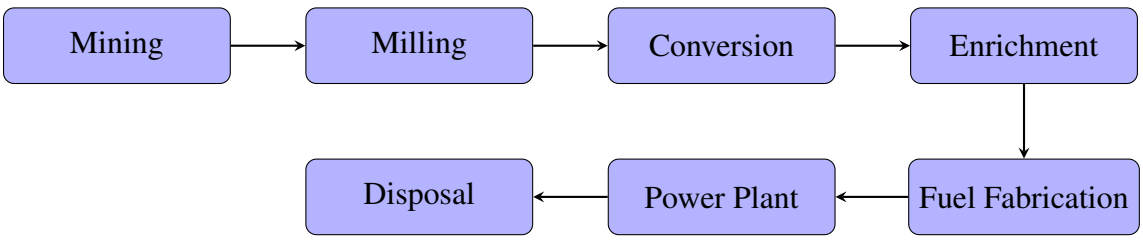
The main goal of the Demand-Driven Cycamore Archetype project is to develop in situ demand driven development schedule calculation through non-optimizing, deterministic-optimizing and stochastic-optimizing algorithms so Cyclus has the capability to deploy supporting fuel cycle facilities to enable a demand to be met.

These prediction models are being developed by University of South Carolina. In this report, we discuss how to design numerical experiments for testing the non-optimizing, deterministic and stochastic prediction methods.

The first section evaluates the required tests for each kind of method assuming a once through fuel cycle. A once through nuclear fuel cycle refers to when spent fuel is not reprocessed.

1 Once through Nuclear Fuel Cycle

Figure 1: Flow Chart of Once through Nuclear Fuel Cycle



Non-optimizing method

Conditions to Satisfy:

- Do all the reactors run?
- Is the input required by the reactors within a specific uncertainty of the analytic solution?
- Is the output of the fuel fabrication facilities within a specific range of the input required by the reactors (calculated by the analytic solution) for all of them to run for each time step?
- Is the output of the enrichment facilities within a specific range of the input required by the fuel fabrication facilities (calculated by the analytic solution) for each time step?
- Is the output of the conversion facilities within a specific range of the input required by the enrichment facilities (calculated by the analytic solution) for each time step?
- Is the output of uranium mining within a specific range of the input required by the conversion facilities (calculated by the analytic solution) for each time step?
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Deterministic-Optimizing method