

Introduction

A transport simulation is composed of a code user, a transport code, a set of physics parameters, a geometric description, and an application dependent data library. Verification involves assessing the sum of these parts against what is considered to be the most precise answer. Validation involves assessing the sum of these parts against what is considered the correct answer. Much effort is spent setting up and running simulations in order to perform verification and validation studies. This project is attempting to automate many of these tasks.

In order to automate this process, geometric descriptions, material compositions, and default physics parameters are stored in a template file. A script is used to generate an input deck from this template for a specific transport code -- e.g. MCNP, PARTISN, or others. The quality assurance (QA) process is simplified by only having to verify the template files and the script as opposed to every input deck. Creating input decks for a different code becomes as straightforward as creating and verifying a new script. Additional scripts will be used to control the execution of the transport code, parse and store the output, and perform automated report generation. Eventually, a user will be able to launch a complete verification or validation job from a minimal specification and obtain a initial report without human intervention.

Methodology

1. Start with a well-specified benchmark experiment, e.g. a critical assembly from the ICSBEP handbook.
2. Extract, by hand or with automation, the key parameters necessary to build a generalized problem description and store as a benchmark template.
3. Repeat 1 & 2 to build a set of validated template files.
4. Gather user input to specify the V&V job specifics (which benchmarks, codes, and data libraries; what run limits, convergence criteria, acceleration options; what output; etc.).
5. Execute scripts to utilize the user's job specification to generate the necessary input files and control scripts.
6. Execute the control scripts to run the transport simulations.
7. Process and store the resulting data from the output files.
8. Generate reports for the current job specification or combine with previous results.

Completed Work

To date, this project has produced:

- Methods for converting a MCNP input file to a generalized template file
- Methods for using a template file to generate MCNP and PARTISN inputs
- Scripts to extract data from MCNP and PARTISN output files for storage
- Scripts to store data from output files to a MySQL database
- Scripts access data stored in database
- Database view linked to web-based Data Query Tool

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