Review
of
"Review and enhancement of Monte Carlo Foam Simulation using Object Oriented Programming, and Message-Passing Interface (Author: Michael Reichenberger)"

This paper is based on the research of validating and improving the techniques of a prior Monte Carlo simulation work done in the process of investigating foam materials as neutron detectors. The random, complex geometry of this class of materials needs the use of Monte Carlo method for the simulation of neutron and charged particle transport phenomena taking place inside. Improvement of the previous method was done by implementing object oriented programming and message passing interface, two topics that were covered in the course work, ME-701. This study dealt with more advanced techniques like "Dynamic Path Generation" and "3-D Vector Tracking" which paves the way to a more accurate investigation. Along with obtaining better accuracy, the present work aimed at attaining flexibility and speed-up. The author claims that the class declaration in the present code with the object oriented programming not only made it easy to expand the study with many types of geometries but also will allow users to handle many parameters.

The following are some comments in favor of this paper:

1. This research paper demonstrates a lot of areas of improvement in the Monte Carlo or in general simulation techniques those were used previously in neutron detection materials study.

2. The author used two advanced fields of computation to make the process more user-friendly and cost-effective. Specially, in case of Monte Carlo simulation achieving speed-up in calculation is crucial.

3. The analysis of the prior work led to discover one fault in the previous method that shows the previous results are over-estimated in case of determining detection efficiency.

4. The author clearly stated what necessitates this research in the "Motivation" section of the paper.

5. The techniques used in the current work are very different from the previous work. The author correctly addresses the need for verification the results with experimental data.

And here are some suggestions to make it more acceptable:

1. For the whole work the base is the previous work done in the same field. In such cases, it needs a mentioning of the base information (Author, Time, published, or unpublished) of the previous work.

2. The organization of the paper needs a bit more attention. Like, the "Objective" section should deal more with the aim of this paper. Providing a nomenclature section is also recommended. For example, the term "DPG" was used without explaining or without any superscript, but it was explained one later para not a previous one.

3. Figure (2) should be made more relevant to what author tried to explain.

4. Although, two data-flows were provided in the Appendix for both previous and current work, some simpler flow-charts are recommended in the "Methods and Procedure" section.

5. It is understandable that the focus of the paper was on the novel methods suggested, and at present the experimental data are not available for verification. Even then there should be some proposition of parallel techniques for verification.

Lastly, my opinion on this research paper is, with some minor revisions, it is acceptable.

Comments for Submission by Reichenberger

Richard Reed

December 11, 2014

Overall the paper is well written and covers topics suitable for publication in Proceedings of ME 701. There are a few minor suggested edits which have been enumerated in detail below. There are some minor grammatical errors, but otherwise the article reads well. It may strengthen the work to devise a small test problem and include some detail about it. Then solve the test problem using your new simulation. You spend much time on comparing your program to the previous program, but relatively little on showing the performance of your program.

1. Overall Comments

    (a) It would be helpful to the reader to show some example of using your program. There is much focus on how your program is an improvement, but relatively little discussion as to using the program. Perhaps devise and show a small sample problem and use your simulation on that problem.

2. Enhancements -Accuracy Improvements:

    (a) First sentence is a fragment

3. Execution Speed Improvements:

    (a) tense of "using a random...enable the"

4. Appendix:

    (a) Perhaps add some supporting text to the figures. They are difficult to interpret

    (b) The figures are difficult to read.

    (c) Are the figures necessary to include at all?