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Title:	Simulation Standards for Threat Reduction Applications
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Abstract

Radiation transport simulations play a vital role in the threat reduction (TR) programs of DTRA, DOE and DHS. The traditional role of simulations as a cost-effective means of scoping out ideas, designing new systems, and analyzing data are vital in the present climate. Many simulation tools are applicable to this area, but each shares a family of common issues that must be addressed for the models to accurately represent reality. How to define geometries, materials, and radiation sources; how to describe detectors and characterize their performance; how to ensure statistical convergence; and how to analyze results are a few of the major, often repeated tasks that could benefit from standardization of methodology. Methods must be clear and consistent and underlying data must be robust and validated to provide assurance that simulations produce the accurate and repeatable results needed to support the analysis of TR applications.

Simulation Standards for Threat Reduction Applications

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JOWOG 29, NRL, Washington DC, Mar. 9-11, 2011

Abstract

Radiation transport simulations play a vital role in the threat reduction (TR) programs of DTRA, DOE and DHS. The traditional role of simulations as a cost-effective means of scoping out ideas, designing new systems, and analyzing data are vital in the present climate. Many simulation tools are applicable to this area, but each shares a family of common issues that must be addressed for the models to accurately represent reality. How to define geometries, materials, and radiation sources; how to describe detectors and characterize their performance; how to ensure statistical convergence; and how to analyze results are a few of the major, often repeated tasks that could benefit from standardization of methodology. Methods must be clear and consistent and underlying data must be robust and validated to provide assurance that simulations produce the accurate and repeatable results needed to support the analysis of TR applications.

Workshop on Radiation Transport Simulation Methodology for Threat Reduction Applications

- Held at Los Alamos, November 18-19, 2008
- Jointly sponsored by DTRA/DNDO/NNSA
- ~100 participants from the US
- Focus on standardization and eventual production of a working document.
- Can we give sponsors and users insight into the calculational process that is consistent between codes and applications?

Topics

1. **Geometry**
    1. Graded approach – level 0 to level 4
    2. Library of geometries
2. **Materials**
    1. Earth, Air, Water, Fire
        1. Seawater: composition, surface contamination, waves, spray
        2. Air: composition, temperature, altitude, humidity
    2. Library of materials
3. **Sources**
    1. Backgrounds – terrestrial, cosmic, NORM, medical
    2. Active sources
    3. Passive sources
    4. Classified sources

Topics (continued)

4. **Detectors**
    1. Intrinsic response of materials (GEB)
    2. Library of geometries (GADRAS is particularly good at this)
        1. 'geometric' response
5. **Calculational Process**
    5. Software QA
        - Statement of work - requirements for the problem
        - Documentation, archiving
        - Installation (compiling parameters)
        - Review process (code, input, output)
        - Training, manuals
    1. Definitions
        1. Flux, current, energy deposition,
    2. Answer convergence

Topics (continued)

6. **Physics**
    1. Aim is not to tell people what model to use
    2. Rather, how is the choice documented?
        1. What options are used
        2. How well benchmarked is the model for your application
        3. What are the limitations?
            1. Consider evaluated nuclear data libraries – photonuclear example.
            2. Are 'warnings' fully understood and communicated in the report?
        4. What is the systematic error?
            1. How do we calculate systematic error
        5. What are the alternatives if you don't have everything you need?

Current Efforts

- **Explosions of GUIs**
  - Adapting modern coding to legacy codes
  - Simplify the use of the code
  - Ideal place for standards
- **RSICC repository**
- **CSWG (cross section working group).**
- **Could there be a SSWG (simulation standards working group). NEA has tried to play such a role in the past.**