COMPUTATIONAL MEDICAL PHYSICS WORKING GROUP

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Abstract

The newly-formed Computational Medical Physics Working Group (CMPWG) can contribute to the Shielding Aspects of Accelerators and Target Irradiation Facilities (SATIF) series of workshops through its interest in shielding benchmarks of medical facilities that employ particle accelerators and general shielding due to the use of radioisotopes in the clinical setting. The use of software tools in the analysis of radiation dose and its health effects has been increasing. CMPWG promotes the advancement of computational tools, experimental data, and enabling technologies which are applicable to clinical problems in medical and health physics.

Introduction

The use of software tools in the analysis of radiation dose and its health effects has been increasing. Such tools include MCNP/MCNPX [1–3], ITS [4], TORT [5], ANISN [6], EGS4 [7–8], PENTRAN [9], GEANT4 [10], ATTILA [11], PARTISN [12], to name a few. The development of many of these software tools in the twentieth century was prompted by nuclear reactor analysis, nuclear weapons studies, accelerators, fusion reactors and health physics concerns. As the field of medical physics continues to grow, the implementation of these software codes in cancer research studies becomes more prevalent.

It is imperative that a union of research encompassing nuclear engineering on one hand and medical and health physics on the other hand be formed. CMPWG was established in 2005 within the American Nuclear Society (ANS) to address the issue. CMPWG is hosted by three divisions of the ANS – Mathematics and Computations Division (MCD), Biology and Medicine Division (BMD), Radiation Protection and Shielding (RPSD). The website is http://cmpwg.ans.org.

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Goals and Activities

CMPWG promotes the advancement of computational tools, experimental data, and enabling technologies which are applicable to clinical problems in medical and health physics. The group concentrates on a multidisciplinary approach (nuclear engineering, medical physics and health physics) for use by the medical practitioners in the studies of radiation imaging, treatment and effects on human and animal life. The applications include computational benchmarks on phantoms and detectors, large scale optimization, deterministic and stochastic approaches to radiation therapy and diagnostic problems.

The Nuclear Science and Technology Division (NSTD) of Oak Ridge National Laboratory (ORNL) sponsored the first workshop of CMPWG on October 26, 2005. The workshop was held to address several key areas:

- Identify the medical physics problems and experiments for computational benchmarks
- Identify the software tools, their applications, strengths and weaknesses
- Identify applications suitable for parallel computing
- Identify the roadmap for benchmarking activities.

Discussions centered on the need for experimental data, the importance of both Monte Carlo and deterministic methods, and the need to evaluate current nuclear data for medical physics. These activities are aimed at improving dose predictions for radiation therapy and other medical activities that utilize ionizing radiation. Proceedings of the workshop are published in the ORNL report "ORNL/TM-2006/7". Copies of the proceedings can be obtained from riceaf@ornl.gov.

The next CMPWG workshop will be held in about 18 months. Participation is voluntary.

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