IEEE NPSS (Toronto), UOIT, Oshawa, ON, 25 & 26 June, 2010
International Workshop on Real Time Measurement, Instrumentation & Control [RTMIC]

RECENT DEVELOPMENTS IN MICRODOIMETRY AT UOIT FOR REAL TIME DOSIMETRIC MEASUREMENTS

A.J. Waker[1,2] and Aslam[1]

[1)] *Faculty of Energy Systems and Nuclear Science, UOIT, 2000 Simcoe St. N., Oshawa, ON, Canada L1H 7K4*
[2)] *Department of Medical Physics and Applied Radiation Sciences, McMaster University, Hamilton, ON, Canada L8S 4M1.*

ABSTRACT

This study presents an overview of the recent developments made in microdosimetric measurements at UOIT for real time dosimetric measurements in mixed photon-neutron fields. An advanced design of an in-house built tissue equivalent proportional counter (TEPC), which consists of 61 individual cylindrical counting volumes in a compact configuration, is described. We demonstrate its performance to produce a truly light-weight radiation protection device by comparing it with a ten times larger commercially available TEPC. The performance of such counters and those commercially available is undermined to an extent in radiation environments where the dose rate of the low LET radiation component dominates over the neutron component. To enhance the performance of our advanced design of TEPC for such radiation environments, the design is further optimized to measure the photon component with 7 sub-elements and the neutron component with the remaining 54 counting elements.

The dosimetric information obtained with TEPCs in mixed field environments can be supplemented with other detectors and counters to obtain comprehensive real time characteristic information of the radiation source. We describe measurements in a mixed low energy neutron and photon field with an in-house built graphite walled proportional counter to obtain microdosimetric and energy information that gives some insight into the fundamental energy deposition processes taking place in the measurement devices. Further work is needed to fully determine the characteristics of the real time dosimetric equipment presented here, which may involve use of analytical techniques and stochastic simulations.