

Uncertainty in Radiation Dosimetry - Basic Concepts and Methods -

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Abstract

The final purpose of radiation dosimetry is to determine the values of various dose quantities for use in research, therapy and last not least in a dose limiting system for protection. These values result from measurements, calculations or a combination of both. Uncertainty is principally associated with measured values and generally with computed ones.

In principal, the knowledge about a dose quantity gained via measurement and calculation is incomplete and therefore expressed by a probability distribution function (PDF) that mirrors the degree of belief in reasonably possible values of that quantity. Depending on the use of the dose value, it may suffice to simply characterize this PDF by its second central moment, i.e. the uncertainty associated with the value, or by set percentiles, e.g. a coverage interval for stating expanded uncertainty.

However, in the process of setting limits and in cases where a quantity is an input quantity, e.g. an efficiency coefficient or the activity of a reference solution, one needs to know the PDF for the quantity explicitly.

The talk introduces and discusses the basic terms, concepts and procedures and relates them to specific problems in dosimetry and

- identifies uncertainty as a quantitative measure of the quality and reliability of determined dose value,
- discusses its use in research, therapy and in dose limiting system for protection and
- explicates the basic concepts and methods used for stating conformity with limits.