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An alternative approach to the decision threshold

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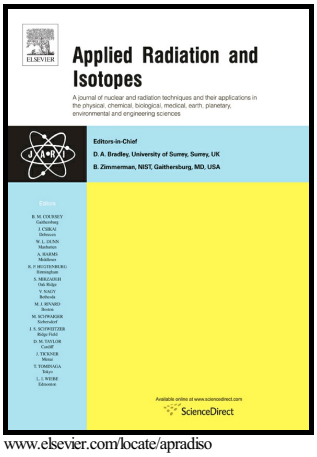

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An alternative approach to the decision threshold

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Abstract

Two effects were identified that induce the dependence of the decision threshold on the uncertainty of the conversion factor. With the first effect, the conversion factor influences the decision threshold directly, through its variability. With the second effect, the variability of the conversion factor influences the decision threshold only when it is not evaluated for the null measurement. Then, the variability of the conversion factor influences the value of the measurand, where the decision threshold is evaluated. Both effects are explained and evaluated.

Keywords: null measurement; indication; conversion factor; uncertainty; decision threshold; lognormal distribution;

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Introduction

The decision threshold, as defined by the standard ISO11929 (2010) (ISO, 2010), is an assessed quantity value. The method of assessment, i.e., its calculation, requires us to multiply the null-measurement uncertainty of the net indication by the coverage factor and by the conversion factor. Since the null measurement uncertainty multiplied by the coverage factor is the well-known Currie's critical limit, the standard only extends, by the method of calculation, i.e., by multiplication with a known constant, the critical limit to the decision threshold. Thus, the assessed value of the measurand (the decision threshold) is calculated as

$$y^* = k_{1-\alpha} \cdot w \cdot u(n_n=0) \ , \qquad (1)$$

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