

Are Measurements Really Uncertain? If so, Why? And, by How Much?

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Abstract

This lecture reviews what we actually mean when we say a measurement is uncertain. The lecture examines, in detail, some of the processes that can make measurements appear uncertain. The lecture also discusses the two main methodologies that are currently being used for evaluating the size of a measurement's uncertainty. Both these approaches are currently recommended in international guidance documents for evaluating measurement uncertainty (i.e. as published by the International Organization for Standardization, ISO). However, these two approaches are incompatible with each other. The lecture shows that the two approaches can produce very different values for the uncertainty of a measurement – in particular, for many measurements that are made at microwave frequencies.

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