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MEASUREMENT UNCERTAINTY OF DEW-POINT TEMPERATURE IN A TWO-PRESSURE HUMIDITY GENERATOR

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This paper describes the measurement uncertainty evaluation of dew-point temperature when using a two-pressure humidity generator as a reference standard. The main difficulty related to this problem arises from the non-linear and iterative nature of the applied mathematical model that provides the measurand estimate. In this case, the analytical method although providing an exact solution, would require a substantial calculus effort and the conventional GUM method is not suitable to provide accurate solutions for this type of measurement uncertainty evaluation. Two alternative approaches are proposed: the forward measurement uncertainty propagation by the Monte Carlo method; and the inverse measurement uncertainty propagation by Bayesian Inference.

The broad application of this study, from the numerous sectors where the measurement of hygrometric conditions is a requirement to any other areas involving the solution of an iterative model, makes it particularly relevant. Thus, besides the information on the use of a two-pressure humidity generator as a dew-point reference standard, the research aimed to establish the influencing factors affecting the use of the Monte Carlo method and the inverse uncertainty propagation using Bayesian Inference in terms of their accuracy and adequacy.

Keywords: Dew-point temperature; Iterative model; Measurement uncertainty.