

## Modelling Uncertainty of Speed of Sound in Humid Air

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We have revised the most complete predictive model of the speed of sound in humid air which is available, i.e. that developed and discussed in 2003 by A. J. Zuckerwar in his *Handbook of the Speed of Sound in Real Gases - vol. III - Speed of Sound in air*. We have updated the data sources for the relevant thermodynamic properties upon which this model is based, including the heat capacities and the virial coefficients of the main constituents of dry air and water vapor, by reference to dedicated equations of state which became more recently available. A critical revision of these input data and of their combined contribution to the model leads to an estimated relative uncertainty as low as 100 ppm for the predicted speed of sound of humid air at ordinary conditions of temperature, pressure and humidity. This estimate sets a limit to the ultimate accuracy which can be achieved by acoustic thermometry in air for the sake of its application in sonic anemometry and in long distance interferometric measurements.