

Uncertainty Analysis for the Wind Measurement Instrument in the Calibration Device

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The first class standard pitot static tubes of National Center for Meteorological Metrology are the highest level standard in China. They play important roles in calibration and traceability in all of China. The wind speed/direction calibration device mainly includes of wind tunnel, first class pitot static tube and compensate-type micropressure meter. Pitot static tube is the calibration standard, the compensate-type micropressure meter is the standard instrument and the wind tunnel is the device which provides them a stable flow field.

According to JJF 1059-1999 "Evaluation and Expression of Uncertainty in Measurement", the Uncertainty of the wind speed/direction calibration device has been analyzed in this work. The uncertainty of wind speed/direction sensors includes type A component and type B component. Type A component would be got from the calibration data through statistics. Type B components were caused by the calibration devices. The results showed that the sources of type B uncertainty components were from 5 parts:

- 1) the uncertainty component caused from the calibration coefficient of first class pitot static tube(Type B);
- 2) the uncertainty component caused from the compensate-type micropressure meter(Type B);
- 3) the uncertainty component caused from the correction of air density(Type B);
- 4) the uncertainty component caused from the properties flow field of wind tunnel(Type B);
- 5) the uncertainty component caused from operating staffs(Type B).

After composed the type A and type B components, the uncertainty of the wind sensor calibrated would be given.

The uncertainty components of the calibration device given by this article were not the all. Within some limits, the other uncertainty components were not described in here, like the install place of the calibrated sensor and the block coefficient in wind tunnel.