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Comparing the sphere anemometer to standard sensors for 2D wind measurements HENDRIK HEISSELMANN, MICHAEL HOELLING, JOACHIM PEINKE, University of Oldenburg & ForWind — The cup anemometers commonly used for wind energy applications are fairly robust, but suffer from several drawbacks like their limited temporal resolution, a systematic overestimation of the wind speed in turbulent flows and the inability to measure the wind direction. While sonic anemometers can measure the wind vector at a higher temporal resolution, they are more fragile and significantly more expensive. Therefore, we propose the sphere anemometer as a robust and highly-resolving alternative to standard anemometers. Designed without wearing parts, the sphere anemometer provides simultaneous wind speed and direction measurements as needed for wind turbine operation especially under challenging conditions such as offshore installation. In our contribution, we introduce the setup of the sphere anemometer which is based on the velocity-dependent deflection of a flexible tube with a sphere mounted atop. The deflection is measured in two dimensions using a light pointer, which allows for the simultaneous determination of wind speed and direction via calibration. Experimental results from wind tunnel measurements with sonic anemometer and sphere anemometer are presented, as well as first comparative measurements from the operation on the nacelle of a near-shore wind turbine.

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