

Master 2016

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**Improving the Accuracy of Interferometric Distance Sensing through
Refractive Index Compensation.**

ABSTRACT - Masterthesis

The topic aims at improving the accuracy of the attocube IDS3010 (Industrial Displacement Sensor) displacement measurement. The principle of the IDS is based on Fabry-Perot interferometry. The accuracy of the displacement measurement at ambient conditions is mainly given by the accuracy of the environmental data provided by a weather station (Environmental Compensation Unit - ECU) which is connected to the IDS. Using these environmental data, the IDS is able to correct the refractive index of the air.

One goal of this work is to specify the accuracy of the refractive index compensation process in the IDS since the interference phase angle is a function of the refractive index. Due to thermal effects in the ECU, the environmental data provided by the ECU might differ from the real data.

C# applications are developed to acquire real time data of the IDS and the ECU for analysing the measurement data. A further goal is to design a test bench for the calibration of the ECU sensors and to find an industry scalable calibration process which ensures the accurate operation of the ECU.