

Ultrasonic Thermometry in the Verification of Accurate Displacement Measurements in Laser Interferometry.

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The accuracy of distance and position measurements using current advances in laser interferometry today is hindered by temperature gradients along the path of the laser. These temperature gradients along with other environmental conditions decrease the accuracy of measurement due to their effects on the refractive index of air. However, depending on the location, temporal and spatial temperature variations may be large and thereby require a process that would output real-time data highlighting changes in these physical factors. The average temperature around the laser path is difficult to calculate unless a good and efficient technique that can take into consideration all other physical factors such as humidity, atmospheric pressure and the rate of change of temperature is implemented. This paper highlights the design, calibration and testing of an ultrasound transducer device for micro-scale temperature measurements. Measurements in very stable conditions will be compared with measurements in layered and turbulent conditions to determine the working efficiency as well as robustness of the setup.

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