

Modelling and Realisation of an Interferometric Setup to Measure Laser Scanhead Mirror Deformations

Master Thesis

Motivation

Interferometry refers to a wide range of techniques in which a coherent and monochromatic source of electromagnetic radiation is superimposed, and valuable information is derived from this. In the presented study, this technique will be used to precisely measure the deformation of laser scanhead mirrors. These mirrors oscillate at accelerations of upwards of 390G ($3,800 \text{ m/s}^2$). Accordingly, these mirrors become compliant and deform, when experiencing a defined eigenfrequency or when exposed to a high powered laser. This deformation can have severe effects on the intended use of these mirrors, especially in the subject of accuracy. Therefore, it is necessary to measure these deformations to understand to what degree of accuracy is lost when these mirrors are in use.

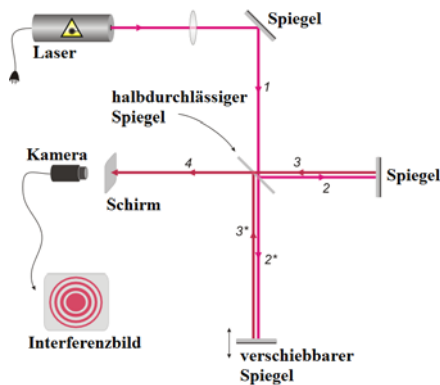


Fig. 1:
Schematic of a Michelson interferometer [Uni. Göttingen]

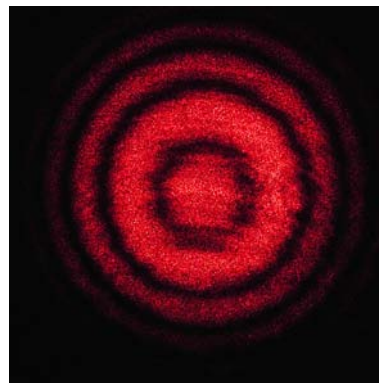


Fig. 2:
Interference pattern of a HeNe laser [de.wikipedia.org]

Task

- Review and selection of an appropriate type of interferometer
- Modelling and simulation of the selected type of interferometer
- Validation and verification of model through a realised setup on an optical table
- Application of previous point to measure deformation of a scanhead mirror
- Documentation

Peripherals

The project offers insight into modelling and simulation, and laser technology. Laser sources and optical components are available in our laser micromachining lab at Technopark Zurich. An ideal candidate may have interest in modelling and laser technology. Previous knowledge in one or more of the above mentioned fields is preferred, but not mandatory. Time to become familiar with the topic will be given. Documentation may be in English or German. Teamwork available.

Start

FS 2012 or upon agreement

Contact

Gregory Eberle
Claus Dold
Josef Stirnimann

PFA H43
PFA H43
CLA G7

044 633 79 47
044 633 79 56
044 632 31 73

eberle@iwf.mavt.ethz.ch

dold@inspire.ethz.ch

stirnimann@inspire.ethz.ch

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