BACHELORARBEIT

Für: **Verfügbar/available**

Gestellt von: **Prof. Dr.-Ing. A. Czylwik**

Thema: **Design of a dielectric beam splitter for a quasi-monostatic terahertz reflection setup**

Terahertz (THz) radiation is defined as electromagnetic radiation approximately in the frequency range from 0.1 to 10 THz. In the last decades some interesting applications for THz technology have been found. THz radiation penetrates many materials which visible light can not. Its absorption properties in water can be used in measurement systems. Also higher resolution distance measurements compared to microwave radiation become possible.
In a monostatic measurement setup, the transmitter and the receiver are co-located. Currently, true monostatic optoelectronic terahertz transceivers are not available. To solve this issue, transmitter and receiver can be spatially separated in a quasi-monostatic setup. The transmitted beam propagates through a beam splitter before it is reflected by the object of interest. The reflected beam follows the opposite direction of the incident beam and is then partially reflected at the surface of the beam splitter. The receiver is positioned at the angle of maximum reflection.
The goal of this thesis is the design of a beam splitter with properties that are optimized for use in a quasi-monostatic setup. The main optimization goal is maximizing the amplitude of the wave that is reflected to the receiver. Because of the wave properties of THz radiation, this is not only a question of the material properties and the orientation of the beam splitter but also dependent on its thickness.

This bachelor thesis entails the following steps:

- creation of a work plan and a time schedule,
- literature research on the used THz systems and on the basics of microwave theory,
- simulation of the reflected amplitude with a programming language of choice,
- preselection of suitable beam splitters for measurements,
- conducting reflection measurements in a quasi monostatic-setup using a THz system,
- ranging measurements and evaluation,
- documentation of the work, and
- presentation of the work in the form of an oral presentation.

Second reviewer: Prof. Dr.-Ing. Jan C. Balzer

Duisburg, _____ Supervisor: _____

Prof. Dr.-Ing. A. Czylwik