QUANTITATIVE OPTICAL COHERENCE TOMOGRAPHY ON BASIS OF A GAUSSIAN BEAM FORWARD MODEL

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Abstract. Optical coherence tomography(OCT) is a non-invasive imaging technique, which produces high-resolution images of the inner structure of biological tissues by measuring the intensity of the backscattered light from the object. Although, OCT is already successfully applied in different fields of medical imaging, especially in ophthalmology, the diagnosis from its only qualitative data is limited in certain cases and additional information needs to be taken into account.
Quantitative information in form of physical properties has been considered as such information and could serve as a key marker in future. Its quantification from experimental data very often represents an ill-posed inverse problem.
In this talk we discuss the direct problem in optical coherence tomography, which later should serve as a basis for the corresponding inverse problem. Hereby, we present a model on basis of a Gaussian beam incident illumination resembling more efficient the strongly focused laser light, which is commonly used in an OCT setup. The accuracy of the model is demonstrated by the comparison of simulated with experimental data consisting of an OCT data set of a layered phantom where the ground truth of the refractive indicies of the different materials are available.

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