

Master Thesis

Ray tracing simulation: Alignment tolerances in full-field X-ray microscopy

Aim

Refractive optics are used in full-field X-ray microscopy with hard X-rays. The ratio of focal length to aperture of X-ray lenses is in the order of 1000:1. The alignment of refractive optics in the X-ray beam thus plays an important role.

In this thesis, the tolerances in the alignment of an X-ray lens in full-field microscopy are to be investigated with the ray tracing software Zemax. After familiarization with the handling of Zemax, ideal structures will first be examined for their fault tolerances with regard to alignment. Subsequently, deviations from the ideal shape, which cannot be avoided due to fabrication, are to be added and quantitatively evaluated. Corresponding Zemax models of such lenses are already available for the most part.

Prerequisites

- Completed basic engineering studies/bachelor's degree
- Basic understanding of geometric optics
- Interest in simulations
- Structured approach and documentation of your work

Research field

X-ray optic,
Simulation

Location

IMT (KIT, Campus Nord)

Main topics

Simulation

Field of study

Optics & Photonics or
Mechanical engineering or
Electrical engineering or
Physics

application period

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