Courses in English
Course Description

Department: 06 Applied Sciences and Mechatronics
Course title: Imaging Optical Design
Hours per week (SWS): 4
Number of ECTS credits: 6
Course objective: After successful completion students have basic knowledge of several types of imaging optical systems. They are able to evaluate aberrations according to usual aberration metrics and know strategies for image quality improvement. They are able to setup and optimise imaging optical systems with professional optical design software.
Prerequisites: Fundamentals according to the bachelor course in Technical Optics
Recommended reading:
I. Nikolaus, Skript & Powerpoint
Teaching methods: 2 SWS seminaristic teaching, 2 SWS Computer-Laboratory
Assessment methods: 100% Written: 90'
Language of instruction: English
Name of lecturer: Prof. Dr. Ines Nikolaus, Rainer Jetter
Email: Ines.Nikolaus@hm.edu
Link: http://www.fb06.fh-muenchen.de/fb/index.php/en/graduate/pom/course-catalog.html?ItemID=&id=82&code=POM218&lang_nr=1
Course content: Fundamentals: notation and conventions, stops and pupils, important rays
Image Quality Evaluation and Aberration Theory: First order chromatic aberrations, 3rd order aberrations (spherical aberration, coma, astigmatism, Petzval, and distortion), and higher order aberrations, common image quality metrics (e.g. spot diagrams, transverse ray plots, wavefront error, Strehl ratio and MTF)
Optimization: strategies of improving a design, optimization with standard optical design software: variables, merit functions constraints and starting points, local vs global optimization
Special optical systems: refractive, reflective and catadioptric systems, systems with decentered and tilted elements, nonrotation-symmetric systems, diffractive systems, multi-configuration systems, afocal and telecentric systems, Gaussian beams, laser optics
Tolerancing: assigning tolerance values, performing a sensitivity analysis, selecting appropriate compensators, probability distributions, and Monte Carlo analyses.
Interferograms / system alignment
Laboratory: introduction to CodeV, computer modeling and optimization of imaging systems or subsystems including eyepiece, telescope, telephoto, digital camera, fibre coupler, prism spectrometer, zoom systems, tele-centric system
Remarks