

Short Courses

Outline

[Optical Design Using ZEMAX](#) is perfect for first time users of ZEMAX who need an introduction to optical design, basic principles and techniques, and design of simple imaging optical systems. This course covers the basics of using ZEMAX, defining optical systems, optimization, ray aberration fans and other diagnostic tools, multiple configurations, apodization, vignetting, and an introduction to tolerancing.

使用 ZEMAX 进行光学设计：这个课程是针对 ZEMAX 的初学者设计的，他们需要了解光学设计、基本原理和技术，同时进行简单成像系统的设计。这个课程涵盖了 ZEMAX 的使用基础、定义光学系统、优化、光线像差 Fans 和其它评价工具，多重结构、切趾法、渐晕和公差的介绍。

Optical Design Using ZEMAX

Who should attend: Engineers who need to learn the basic use of the ZEMAX Optical Design Program. This course covers imaging properties, glass properties and selection, and classical design techniques. Attendees will learn how to use ZEMAX, including defining optical systems, constructing merit functions, and performing optimizations. Diagnostic tools are also covered. This is the perfect course for those who need a basic knowledge about optical system theory and design.

针对的人士：需要学习 ZEMAX 光学设计软件基本应用的工程师。本课程包括成像系统的特性，玻璃库的特性及选择和经典的设计技术。参加的人员将会学到如何使用 ZEMAX，包括定义光学系统、建立评价函数并进行优化，评价工具也会被介绍。这些经典的课程是专门为需要学习光学系统理论和设计基础的人员设计的。

一阶光学理论

- 折射和反射
- Glass definition and properties
- 玻璃的定义和性质
- Image formation and ray tracing
- 成像和光线追迹
- Stops, pupils, marginal and chief rays
- 光栏、光瞳、边缘光 and 主光线

Aberration theory

相差理论

- Aberration descriptions
- 像差的含义
- Identifying aberrations
- 像差的识别
- Seidel and Zernike aberrations
- Seidel 和 Zernike 像差
- Aberration balancing
- 像差的平衡
- Chromatic aberrations
- 色差

Use of ZEMAX

使用 ZEMAX

- How optical design programs model lenses
- 如何用软件建立镜头
- The surface model
- 面的建模
- Overview of the manual and help system
- 用户手册和帮助系统总览
- The ZEMAX user interface
- ZEMAX 的用户界面
- Conventions and definitions
- 约定和定义
- Surface, field, wavelength, system data
- 面、视场、波长、系统数据
- Apertures, F/#'s
- 孔径、f/#
- Use of solves and variables
- 使用求解和变量
- Surface apertures
- 面的孔径

ZEMAX diagnostic tools

ZEMAX 的评价工具

- Ray fans and spot diagrams
- 光线的 fans 和点列图
- RMS and through focus plots

- RMS(均方根)和 through focus 图
- 2D, 3D, wireframe, and solid model layouts
- 2D、3D、线框架和固体模型图
- MTF plots
- MTF 图形
- Field curvature and distortion
- 场曲和畸变
- Diffraction effects
- 衍射的影响
- Other diagnostic tools
- 其它评价工具

Prisms

棱镜

- Basic prism types
- 基本棱镜的类型
- Tunnel diagrams
- 隧道图

Singlet design

单透镜的设计

- Merit function construction
- 评价函数的结构
- Using optimization, setting variables
- 使用优化、设定变量
- Boundary constraints
- 定义边界条件

Designing achromats

设计消色差透镜

- Controlling magnification, EFL, spacings
- 控制放大率、有效焦距和镜头间距
- Simple use of solves
- 求解的简单应用
- Correcting chromatic aberrations
- 校正色差
- Glass selection and optimization
- 高斯选项和优化

More complex systems

复杂的系统

- Cooke triplet
- 库克三透镜
- Collimation
- 准直系统
- Spectrometers
- 光谱仪
- Relay lenses
- 连接透镜
- Beam expanders
- 光束放大器
- Designing with stock lenses
- 利用镜头库设计
- Double Gauss
- 双高斯镜头
- Zoom lens design
- 变焦距镜头设计
- Scanning systems
- 扫描系统

Pupil modeling

光瞳的建模

- Vignetting factors
- 渐晕因子
- Apodization
- 切趾法
- Ray aiming
- 光线瞄准

Designing with mirrors

带反射镜的设计

- Telescopes
- 望远镜
- Adding fold mirrors
- 加入反射镜
- Newtonian telescope
- 牛顿望远镜
- Maksutov telescope

- 马克苏托夫望远镜
- Schmidt-Cassegrain
- 施密特-卡塞格林望远镜
- Off axis designs
- 离轴的设计

Introduction to tolerancing

公差的介绍

- Tolerance types
- 公差类型
- Tolerance analysis
- 公差分析
- Test plate fitting
- 样板符合测试