Optical System for Inspection of Micro-Structured Wafer
Abstract

In semiconductor industry, wafer inspection systems are used to detect defects on a wafer and find their positions. To ensure the image resolution for the microstructures, the inspection system often employs a high-NA objective and works in the UV wavelength range. As an example, a complete wafer inspection system including high-NA focusing effect and light interaction with microstructures is modeled, and the formation of image is demonstrated.
Modeling Task

**inspection objective**
- NA = 0.9
- effective focal length 2 mm
- back focal length 750 µm

**input field**
- fundamental Gaussian
- wavelength 266.08 nm
- full divergence angle 0.075°
- circularly polarized

**imaging lens**
- Newport SPX031AR.10
- effective focal length 500 mm

**beam splitter**

**image**

**micro-structured wafer**
Ray-tracing analysis provides a fast overview of the complete system, including high-NA lens and grating.
Results

Rigorous simulation of grating with Fourier modal method (FMM) is imbedded within the system simulation.

1st diffraction orders

behind micro-structured wafer
Results

Image is formed by interference of different diffraction orders. Simulation of complete system from input field to image plane takes less than 10 seconds!
## Document Information

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