

DiffractMOD

DiffractMOD is a design and simulation tool for diffractive optical structures such as diffractive optical elements, subwavelength periodic structures, and photonic bandgap crystals. It is based on the Rigorous Coupled Wave Analysis (RCWA) technique that has been implemented using advanced algorithms including fast Fourier factorization and generalized transmission line formulation. Already a market leader, the tool has extensive applications in a broad range of areas including semiconductor manufacturing and wave optics.

Benefits

- ▶ Incorporates advanced algorithm options that extend the basic RCWA technique to improve its robustness, efficiency, and user friendliness.
- ▶ Fully integrated into the RSoft CAD Environment (page 6).

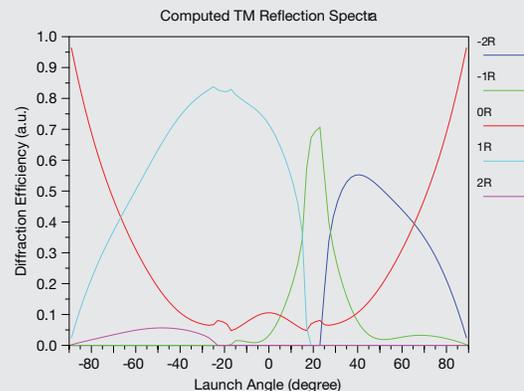
Applications

DiffractMOD can handle complicated periodic structures containing both dielectric and metallic components with lossy or dispersive materials. It has application to a wide range of devices including, but not limited to:

- ▶ Waveguide resonance gratings
- ▶ Diffractive Optical Elements (DOEs)
- ▶ Surface relief and volume index gratings
- ▶ Wavelength filters
- ▶ Optical metrology
- ▶ Nano-lithography
- ▶ Polarization sensitive devices
- ▶ Artificial dielectric coatings
- ▶ Photovoltaic systems
- ▶ 3D displays
- ▶ Optical interconnections
- ▶ Optical data storage
- ▶ Spectroscopy

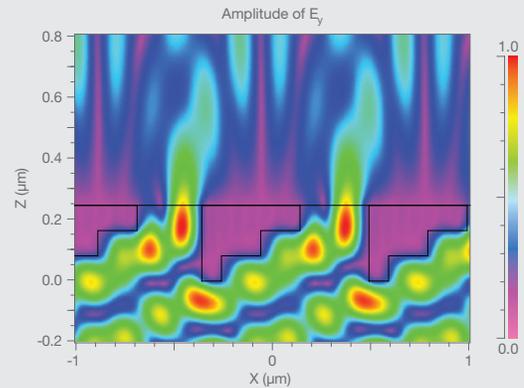
Featured Application

Computed spectra for TM reflected diffraction orders for a 2D metallic grating.

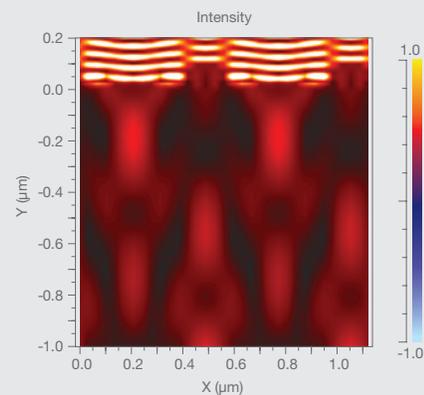


Features

- ▶ Advanced algorithm options are used to improve convergence.
- ▶ Modal Transmission Line (MTL) framework to ensure that the simulation is unconditionally stable.
- ▶ Full vector simulations for both 2D and 3D. Additionally, conical incidence is allowed.
- ▶ An inverse rule is used to improve the convergence of TM fields. For 3D simulation, DiffractMOD can choose appropriate algorithms depending on structures.
- ▶ Increased performance through multi-threading and GPU acceleration on computers with multiple cores/CPU and high-end graphics cards.
- ▶ Account for material dispersion and complex refractive index for metals.
- ▶ Calculate, display, and output spectra of diffraction efficiency for any diffraction order.
- ▶ Calculate total reflected power, transmitted power, and absorbed power.
- ▶ A wide range of analysis and monitoring features to measure common electromagnetic quantities at any position such as field profiles, power flux, energy densities, overlap integrals, far fields, and the Poynting Vector.
- ▶ Spectrums vs. wavelength, angle and polarization for any diffraction efficiency can easily be computed.
- ▶ Output common metrology parameters directly.



Field profile of metallic grating structure.



Simulation of a Phase Shift Mask with DiffractMOD.

SEE PAGE 42 FOR SYSTEM REQUIREMENTS