

# ModePROP

ModePROP is an Eigenmode expansion propagation tool that accounts for both forward and backward propagation and radiation modes. It provides a rigorous steady-state solution to Maxwell's equations that is based on the highly-stable Modal Transmission Line Theory. A full array of analysis and simulation features make this tool flexible and easy to use.

## Benefits

- ▶ Rigorous full-vector analysis.
- ▶ Solves for both forward and backward traveling modes.
- ▶ Fully integrated into the RSoft CAD Environment (page 6).

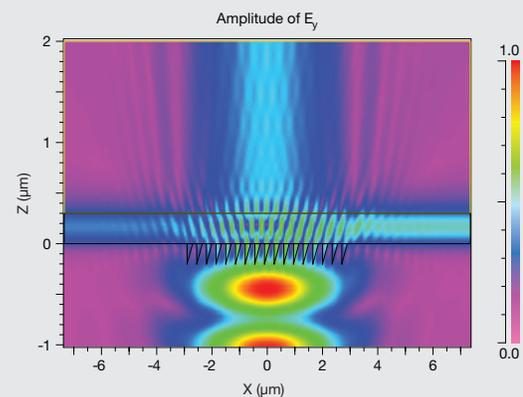
## Applications

ModePROP has applications including, but not limited to:

- ▶ Waveguide/fiber-based systems
- ▶ Surface-normal grating couplers
- ▶ Plasmonic devices
- ▶ Sensors
- ▶ Filters
- ▶ Mode converters
- ▶ Photonic bandgap
- ▶ Computing coupling efficiency

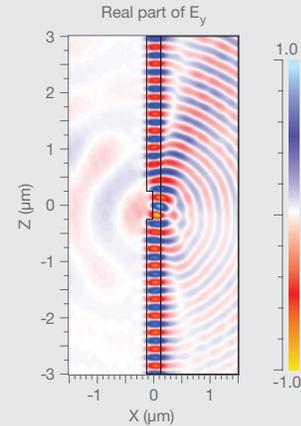
## Featured Application

ModePROP simulation results of a blazed finite surface grating. An incident Gaussian beam is coupled into a waveguide by a surface grating.

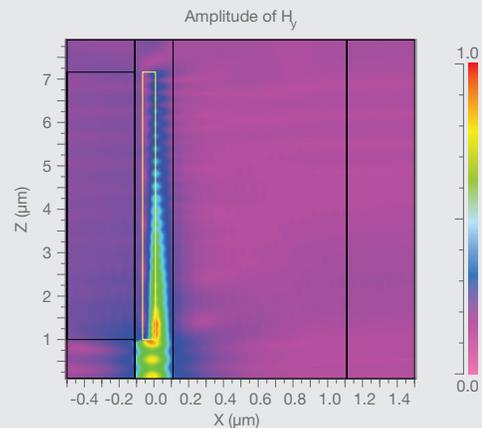


## Features

- ▶ Full-vectorial analysis for both Cartesian and cylindrical (azimuthally symmetric) structures in 2D and 3D.
- ▶ Modal Transmission Line (MTL) framework to ensure that the simulation is unconditionally stable.
- ▶ Increased performance through multi-threading and GPU acceleration on computers with multiple cores/CPUs and high-end graphics cards.
- ▶ Accounts for reflections.
- ▶ User-defined initial field.
- ▶ Accommodates complex index for lossy materials and high index contrast profiles.
- ▶ Robust meshing scheme which conforms to the structure.
- ▶ PML boundary conditions.
- ▶ Output information includes transmission/reflection of individual modes as well as total values, and the Poynting Vector.
- ▶ Sophisticated output options allow user to calculate and display field profiles and other electro-magnetic quantities at any position.
- ▶ Automated parametric studies and design optimization using MOST (page 24).



**Simulation results that show the field scattered by an air groove.**



**Simulated field within a surface plasmon based interferometer that is operating out of phase.**

SEE PAGE 42 FOR SYSTEM REQUIREMENTS