FullWAVE

FullWAVE is a highly sophisticated simulation tool for studying the propagation of light in a wide variety of photonic structures including integrated and fiber-optic waveguide devices as well as circuits and nanophotonic devices such as photonic crystals. The software employs the Finite-Difference Time-Domain (FDTD) method for the full-vector simulation of photonic structures. FullWAVE's award-winning innovative design and feature set has made it the market leader among optical device simulation tools.

Benefits

- Cutting-edge implementation of mature FDTD algorithm allows for a wide range of simulation and analysis capabilities.
- Advanced capabilities allow for clustered simulation environment for massive computational increases in speed and efficiency.
- Fully integrated into the RSoft CAD Environment (page 6).

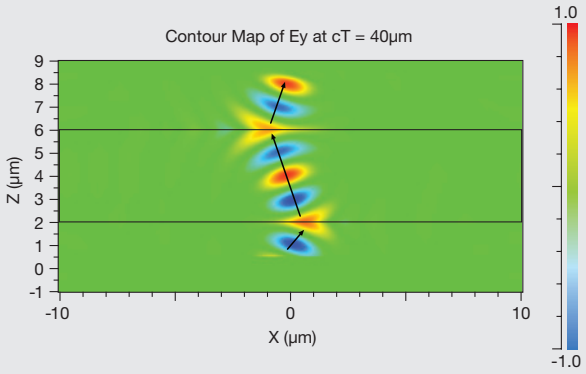
Applications

FullWAVE has applications in a wide range of integrated and nano-optic devices including, but not limited to:

- WDM devices such as ring resonators
- Photonic bandgap circuits & applications
- Grating structures, surface normal gratings, and other diffractive structures
- Cavity computations and extractions
- Nano- and micro-lithography
- Biophotonics
- Light scattering
- Metrology
- LED extraction analysis
- Sensor and bio-sensor designs
- Plasmon propagation effects
- Surface plasmons
- Negative refractive index materials

Featured Application

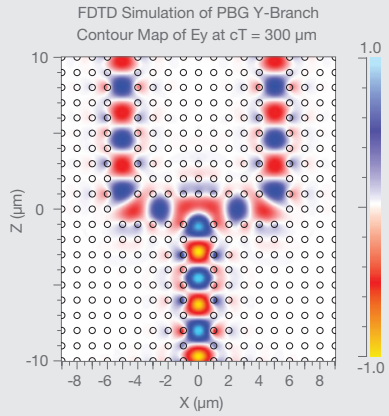
Demonstration of negative index refraction with the propagation of a beam through a left handed material bounded by air.



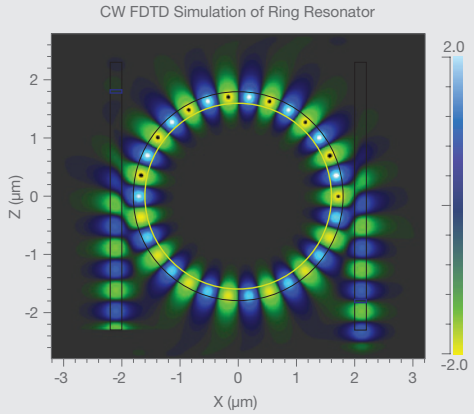
Features

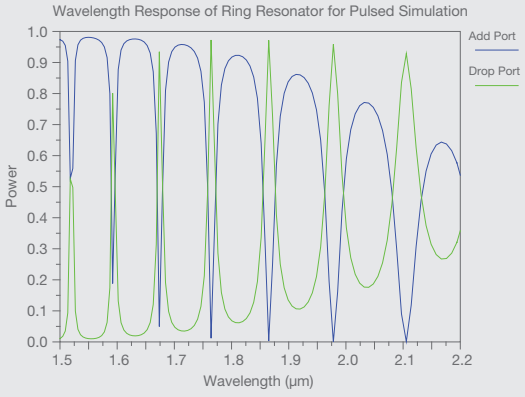
- Advanced and robust FDTD implementation allowing for full-vector field solutions in arbitrary structures and materials.
- 2D, radial, and 3D simulation capabilities.
- Non-uniform mesh.
- Full control of dispersion, non-linear (χ^2 and χ^3), and anisotropic effects.
- Frequency-dependent saturable gain model.
- Includes Perfectly Matched Layer (PML), PEC, periodic, and symmetric/anti-symmetric boundary conditions.
- Advanced excitation options for multiple launch fields, each with different spatial and temporal characteristics such as position, wavelength, direction, polarization, and temporal excitation. Point sources and white light sources are also available.
- Total-field/scattered-field formulation for scattering problems.
- A wide range of analysis and monitoring features to measure common electromagnetic quantities such as field profiles, power flux, energy densities, overlap integrals, far fields, and the Poynting Vector. Additionally, both FFT and DFT options are included for frequency analysis.
- Includes Q-Finder, a utility that automates the search for cavity modes and Q-factors.
- Automated parametric studies and design optimization using MOST (page 24).
- Increased performance through parallel processing via multi-cpu/core machines and/or clustering across a network of computers. Contact Synopsys' Optical Solutions Group for licensing policies regarding this feature.
- A native 64-bit version of FullWAVE is available that takes advantage of modern 64-bit CPUs that support additional system memory (RAM).

SEE PAGE 42 FOR SYSTEM REQUIREMENTS



FullWAVE CW simulation of photonic bandgap y-branch structure.





Top: CW response of ring resonator run at a wavelength resonance of 1.593µm.

Bottom: Wavelength response of a pulsed simulation of the same resonator.