

MEFiSTo-2DTM

Electromagnetic Simulator

WHAT IS MEFiSTo-2D ?

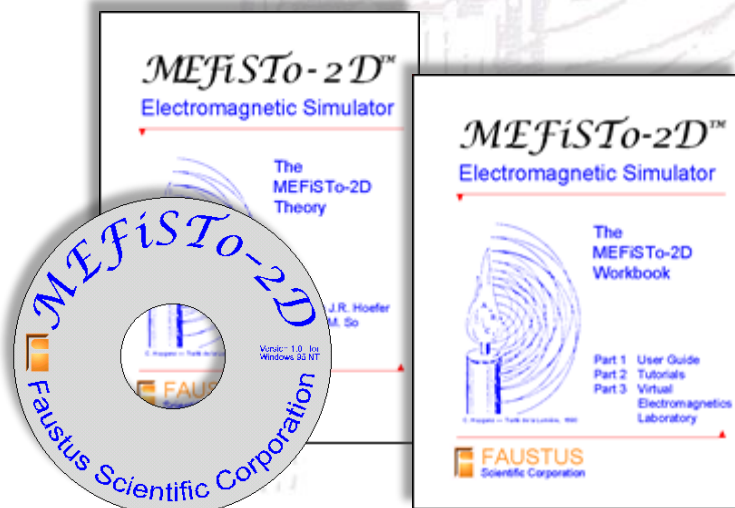
MEFiSTo-2D is a *M*ulti-purpose *E*lectromagnetic *F*ield *S*imulation *T*ool. Faustus Scientific Corporation has created this tool to specifically address the requirements of **educators, students, and professionals** who work with electromagnetic fields and waves. It was designed from the start to operate in the PC environment under Windows Operating Systems. It is based on the Transmission Line Matrix (TLM) method.

MEFiSTo-2D allows you to solve and visualize 3D fields and waves that are functions of two space dimensions and time. It has an easy-to-use graphical interface and powerful processing capabilities.

MEFiSTo-2D has the functionality of a

- time domain reflectometer,
- microwave vector network analyzer,
- spectrum analyzer,
- signal processor, and
- video system.

Note: MEFiSTo-2D displays all data as they are generated during a simulation. You see the solution evolve at a speed suitable for human observation. No long waits, no tedious post-processing!



THE *MEFiSTo-2D* PACKAGE INCLUDES

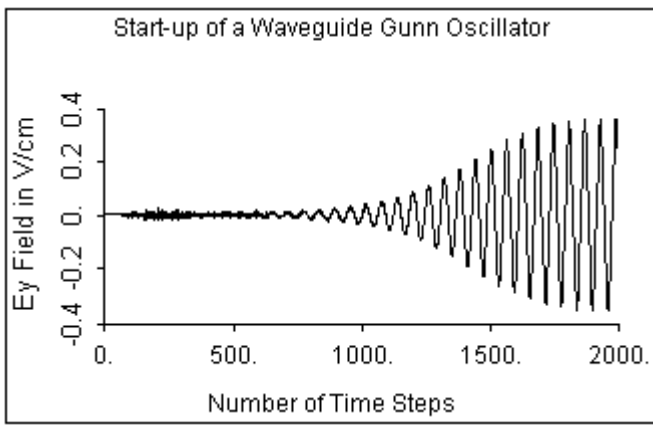
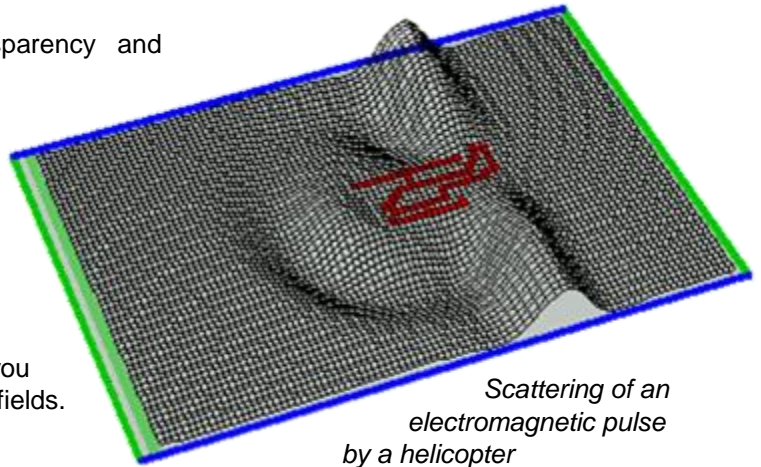
- One CD-ROM with the MEFiSTo-2D program and electronic help files.
- The MEFiSTo-2D Workbook (Operating Manual, Tutorials and VEL). 140 pages.
- The MEFiSTo-2D Theory Book (Theoretical Foundations of the 2D TLM method). 120 pages.
- One year of free user support via e-mail from the date of purchase.

The software can still be downloaded free of charge at <http://www.faustcorp.com>

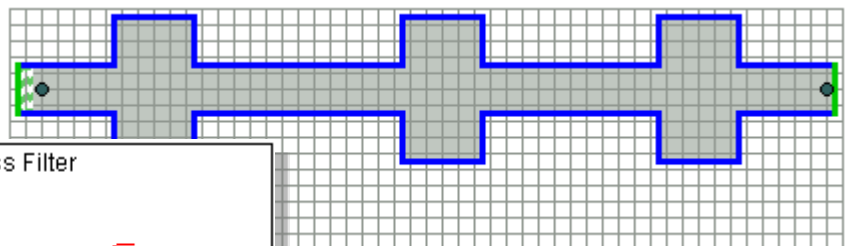
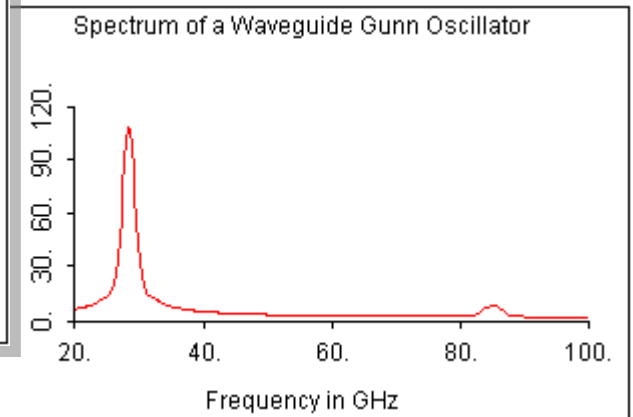
WHAT IS SPECIAL ABOUT MEFISTO-2D?

MEFiSTo-2D offers you unprecedented transparency and interactivity. With *MEFiSTo-2D* you can observe field propagation and interaction with boundaries, materials, and devices, and you can intervene at every phase of the simulation.

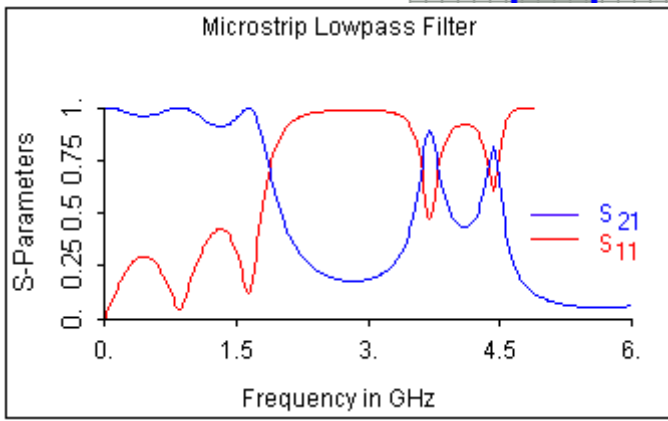
MEFiSTo-2D solves Maxwell's equations in time and space; the solution is life-like, and you can simulate both transient and time harmonic fields.



Transient modeling of active components

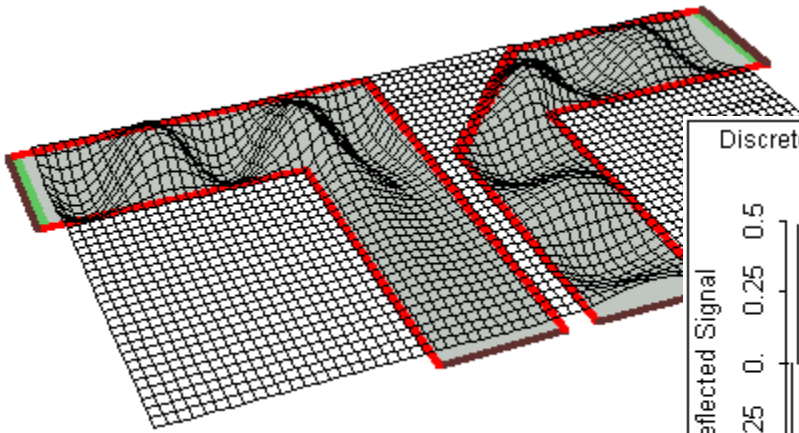


Modeling of a microstrip lowpass filter

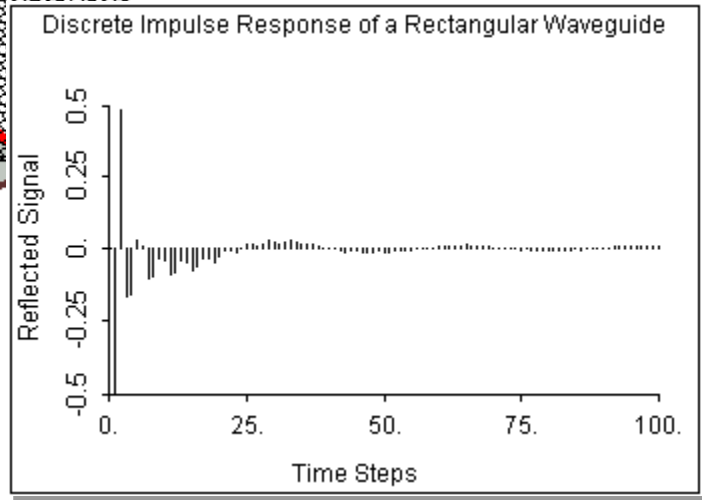


MEFiSTo-2D performs co-processing, not just the usual post-processing of field data. You can observe the evolution and convergence of scattering parameters, harmonic signal content, or return loss at every timestep.

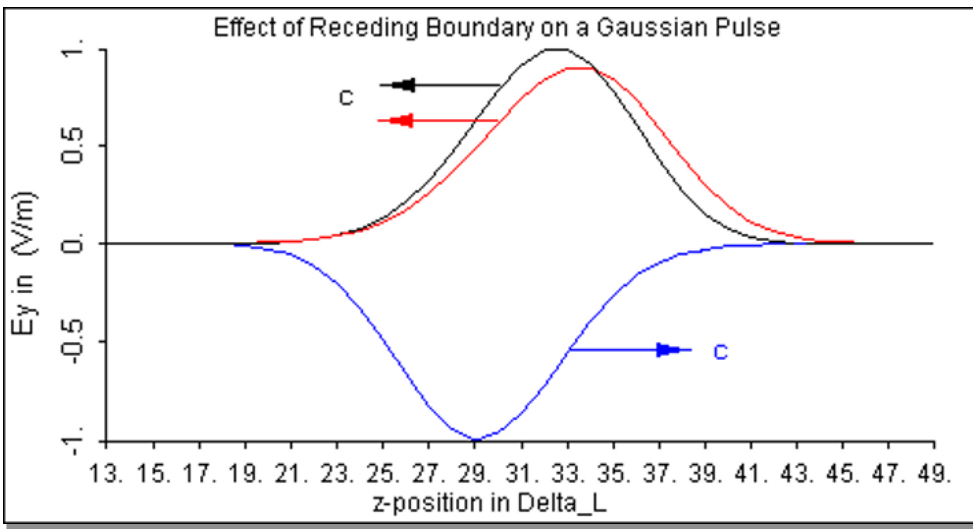
MEFiSTo-2D features numerical convolution capability in time. This enables the modeling of arbitrary frequency-dispersive boundary behavior, and the partition of structures in time domain.



Effect of chamfer on the transmission through a rectangular waveguide bend (TE_{10} mode). The discrete impulse response on the right is used to model a wideband matched load at the waveguide ports using numerical convolution.



MEFiSTo-2D allows you to simulate not only forward but also backward in time. It also features moving boundaries, allowing you to observe the Doppler effect in the time domain.



A Gaussian pulse (blue) moving towards an electric boundary is reflected with a -1 reflection coefficient.

The black pulse is due to a reflection by a stationary electric boundary, while the red pulse has been reflected by an electric boundary that recedes with a velocity $0.05c$.

Since the user has full control over the discretization of space, *MEFiSTo-2D* is perfect for studying numerical dispersion, discretization errors, stability, and convergence in time and space discrete systems. *MEFiSTo-2D* comes with a suite of well documented experiments called the **Virtual Electromagnetics Laboratory**. It contains hyperlinks to the appropriate experiment files and has been designed specifically for teaching and self-study.

THE VIRTUAL ELECTROMAGNETICS LABORATORY

The **Virtual Electromagnetics Laboratory (VEL)** is a suite of virtual electromagnetics experiments for *MEFiSTo-2D*. They resemble the experiments presented in electromagnetics and microwave courses, complement textbooks and laboratory manuals on the subject, and demonstrate how *MEFiSTo-2D* elucidates electromagnetic principles and the behavior of microwave and millimeter-wave components.

Each experiment has been set up as a separate file that can be opened with *MEFiSTo-2D.exe*. Of course, you may edit each structure and modify the experiments, or create new experiments of your own. You may even use the format of this **Virtual Electromagnetics Laboratory** to create your personalized learning program.

The **Virtual Electromagnetics Experiments** included in the *MEFiSTo-2D* package are:

- 1) Wave Propagation on TEM Transmission Lines
- 2) Wave Propagation in Rectangular Waveguides
- 3) Mode Fields in Rectangular Waveguides
- 4) Scattering at a Discontinuity in a Rectangular Waveguide
- 5) Scattering at a Waveguide T-Junction
- 6) Study of a Hybrid Branchline Coupler
- 7) Diffraction of a Plane Wave by a Small Aperture
- 8) Diffraction of a Plane Wave by a Knife Edge
- 9) Scattering of a Plane Wave by a Dielectric Cylinder of Square Cross-Section
- 10) Scattering of a Plane Wave by a Helicopter
- 11) Parametric Frequency Halving using Varactor Diodes
- 12) Microwave Oscillator with Negative Conductance Diode

EDUCATORS:

Enrich your teaching through live field simulations and virtual experimentation. Project *MEFiSTo-2D* directly in class, embed it into a PowerPoint or HTML presentation for impact. *MEFiSTo-2D* is an educational tool *par excellence*.

STUDENTS:

Turn mathematical abstractions into a visual process using *MEFiSTo-2D* and gain intuitive insight into e.m. field and wave behavior. Transform your PC into an exciting and enriching virtual laboratory for a small fraction of its cost.

ENGINEERS, SCIENTISTS :

Quickly test new concepts and ideas, explore technical feasibility, and visualize physical behavior. Understand the electromagnetic field effects associated with high speed/high frequency electronic signals. Demonstrate the functionality of your designs to customers and clients: seeing is believing!



Website: <http://www.faustcorp.com>

Note that Faustus Scientific Corporation has been dissolved in September 2017