

*MEFiSTo-2D*TM

Electromagnetic Simulator

WHAT IS *MEFiSTo-2D* ?

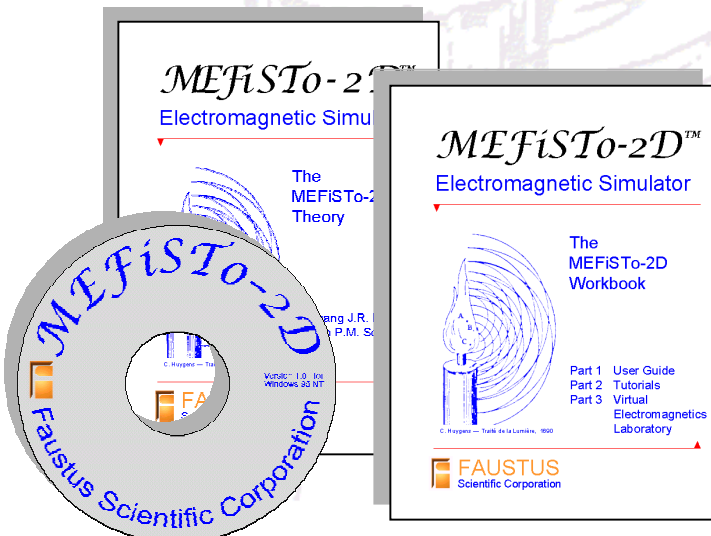
MEFiSTo-2D is a **M**ulti-purpose **E**lectromagnetic **F**ield **S**imulation **T**ool. Faustus Scientific Corporation has created this tool to specifically address the requirements of **educators, students, and professionals** who work with electromagnetic fields and waves. It was designed from the start to operate in the PC environment under Windows 95/98/NT. 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

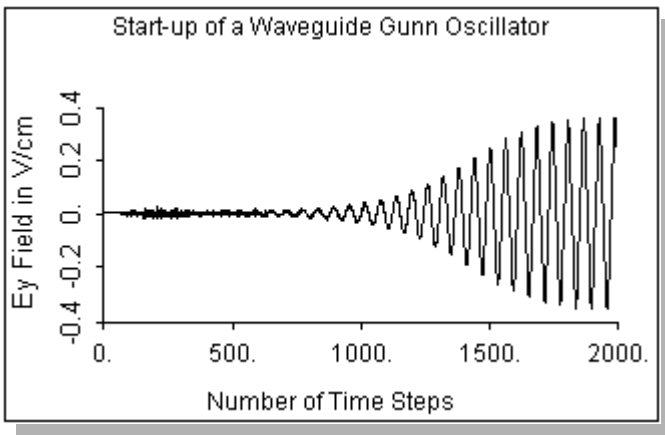
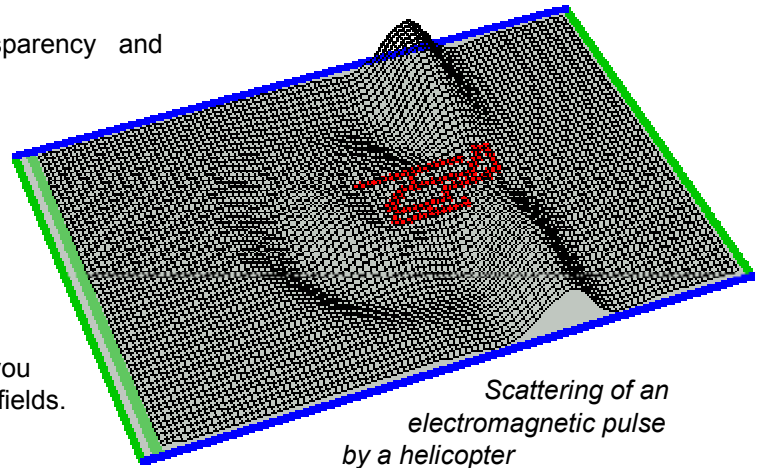
- One CD-ROM with the MEFiSTo-2D program and electronic help files.
- The MEFiSTo-2D Workbook (Operating Manual, Tutorials and VEL). 140 pages.
- The MEFiSTo-2D Theory Book (Theoretical Foundations of the 2D TLM method). 120 pages.
- One year of free user support via e-mail from the date of purchase.

Visit our website <http://www.faustcorp.com> or contact us for details.

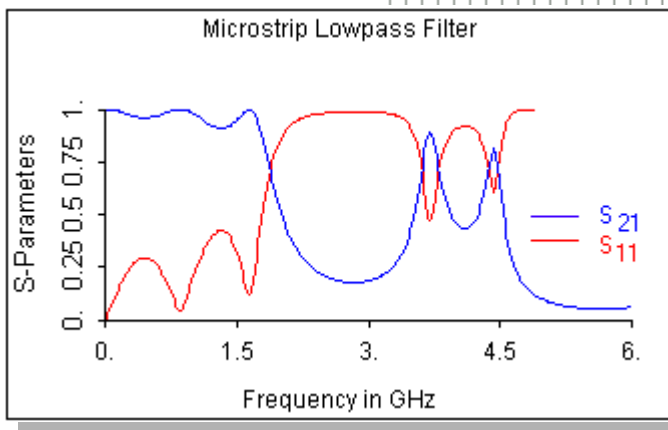
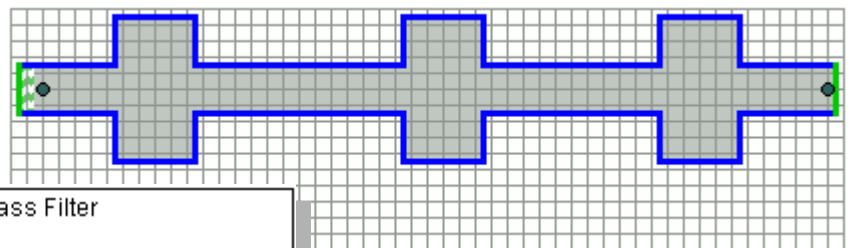
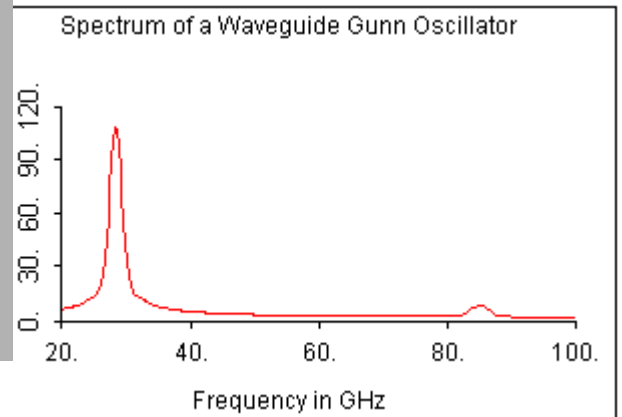
WHAT IS SPECIAL ABOUT MEFISTO-2D?

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.



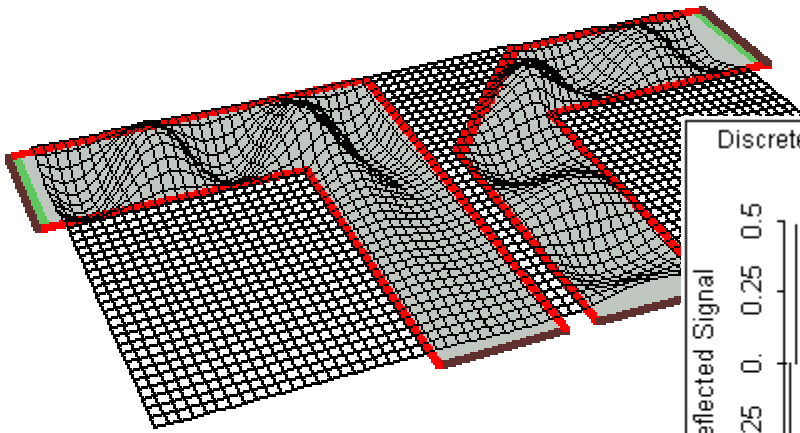
Transient modeling of active components



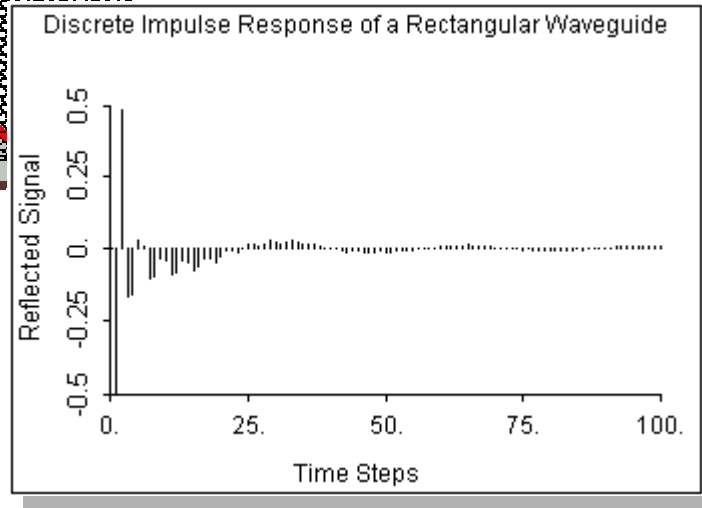
Modeling of a microstrip lowpass filter

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.

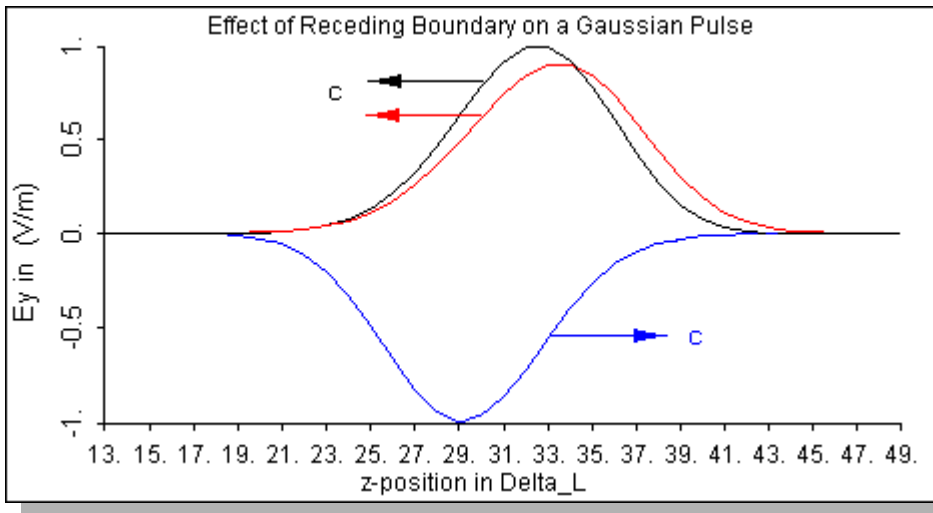
MEFiSTo-2D features numerical convolution capability in time. This enables the modeling of arbitrary frequency-dispersive boundary behavior, and the partition of structures in time domain.



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. We at **Faustus Scientific Corporation** would be delighted to create a link to your website if you are interested in sharing your Virtual Electromagnetics Experiments with others. Please contact us at marketing@faustcorp.com.

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!



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