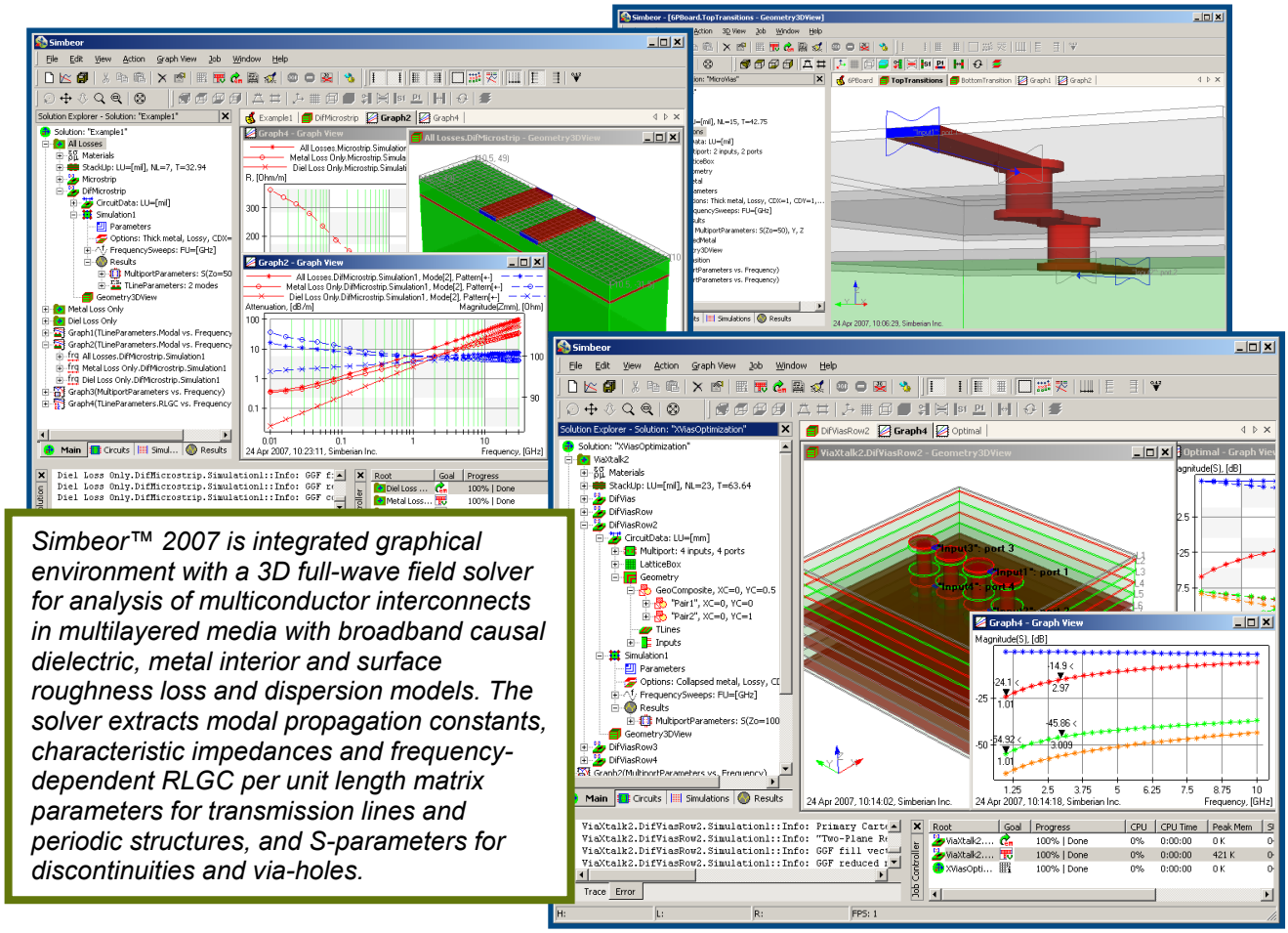
DATASHEET

Simbeor™ 2007

3D Full-Wave Electromagnetic Simulator for Multilayered Circuits

Tool to Build Broadband Models for Interconnects

Faster data rates drive the need for accurate electromagnetic models for multi-gigabit serial data channels. Both early exploration of the interconnect budget and channel verification require frequency-dependent ultra-broadband RLGC models for transmission lines and S-parameter models for via holes extracted with a 3D full-wave electromagnetic simulator. **Simbeor 2007 is a tool to produce such 3D full-wave models for transmission lines, periodic structures, discontinuities and via-hole transitions.** Without these advanced models, a channel design may require experimental verification and iterations to improve overall performance, adding delays and increased costs to the project.

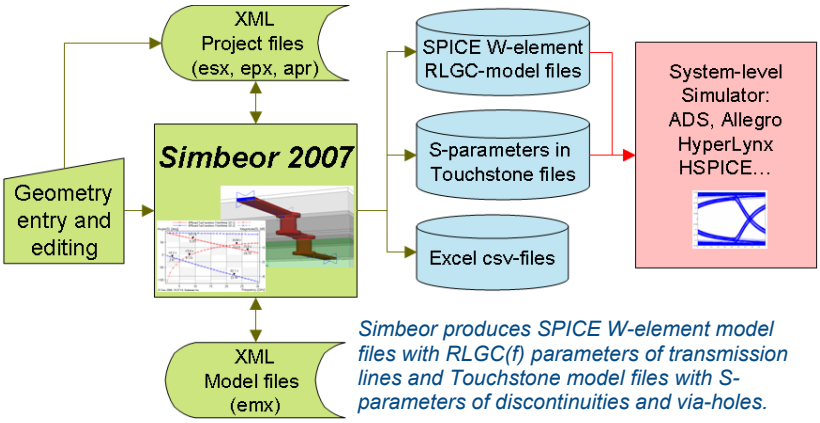


Simbeor™ 2007 is integrated graphical environment with a 3D full-wave field solver for analysis of multiconductor interconnects in multilayered media with broadband causal dielectric, metal interior and surface roughness loss and dispersion models. The solver extracts modal propagation constants, characteristic impedances and frequency-dependent RLGC per unit length matrix parameters for transmission lines and periodic structures, and S-parameters for discontinuities and via-holes.

Overview

Simbeor 2007 allows you to build broadband 3D full-wave models for multiconductor transmission lines, periodic structures, discontinuities and via-holes. **It is the industry-first solver that accounts for effects of multilayered dielectric and metal surface finish, surface roughness, use causal ultra-broadband conductor and dielectric models**. **It also provides unique capability to synthesize impedance-controlled via-holes.** Simbeor 2007 extracts frequency-dependent RLGC per unit length matrix parameters for transmission lines and periodic structures in SPICE W-element model format, and de-embedded S-parameters for discontinuities and via-holes in Touchstone format. **The models can be used in practically any system-level design flow.**

Simbeor 2007 provides more accurate models than static or quasi-static field solver and accounts for more broadband effects than any other electromagnetic solver.



Simbeor produces SPICE W-element model files with RLGC(f) parameters of transmission lines and Touchstone model files with S-parameters of discontinuities and via-holes.

Technology

Simbeor 2007 solver innovative technology combines results of over 20 years of research. Hybrid simulation technique is based on the self-regularized method of lines (MoL) and Trefftz finite element method (TFEM). MoL provides fast and accurate solution for multi-layered dielectrics and metal planes. TFEM is used to simulate trace conductors interior. Method of simultaneous diagonalization is used for extraction of modal and per unit length parameters of lossy multiconductor transmission lines and for precise multimodal de-embedding of discontinuities.

Benefits

- Identify design problems that can not revealed with simplified models from static or quasi-static field solvers
- Advanced 3D broad-band transmission line models accounts for all conductor and dielectric loss and dispersion effects
- Optimize geometry and create accurate full-wave models for localizable via holes and transitions
- Easy-to-use and easy-to-learn 3D electromagnetic simulation environment
- Very affordable 3D electromagnetic solution
- Faster time to market and overall lower design costs

Use Simbeor 2007 When …

- Your next PCB or package design requires 3D full-wave electromagnetic extraction
- You designed a multi-gigabit data channel with a static or quasi-static field solver and want to validate it with a more rigorous approach to avoid expensive board turns and project delays
- You have doubts with results obtained with your current electromagnetic tool
- You need to identify parameters of a conductive or dielectric material on the base of measured data

Specifications

Simbeor has been tested on Windows 2000/XP/Vista operating systems. It requires at least 1 GB memory and 1 GHz or faster processor to run (2-3 GHz systems with 2-4 GB memory are preferable). To support 3D views, Simbeor requires a 3D graphic card. It has been tested on different Intel and AMD single and dual-core processors.

Support

Simberian engineers can answer your technical questions by telephone +1-206-726-1098 (skype *simberian*) or e-mail support@simberian.com. They can also provide technical assistance and online on onsite training. Simberian Knowledge Base www.kb.simberian.com gives you answers to your technical questions – 24 hours a day, 7 days a week.

Simbeor 2007 Unique Features

Transmission line creation wizards. Specify layers, width and positions of any number of traces and the wizards create all other elements for the 3D parameters extraction automatically.

Via-holes creation wizards. The wizards help you to create typical single and differential via-hole structures with inputs or ports that are ready for broadband electromagnetic model extraction without any additional steps.

Fast effective impedance estimation in the differential via-hole creation wizard. It helps you to synthesize impedance-controlled differential via-holes geometry in seconds.

3D full-wave analysis. Simbeor solves Maxwell's equations with all six electromagnetic field components and displacement term in 3D domain for both transmission line and discontinuity parameters extraction. Extracted parameters include high-frequency dispersion due to the components of electromagnetic field along the traces.

Causal wideband Debye dielectric dispersion and loss models. Composite materials used in PCBs and packaging applications are best characterized by the wideband Debye model. The model can be constructed with just one measurement of dielectric constant and loss tangent.

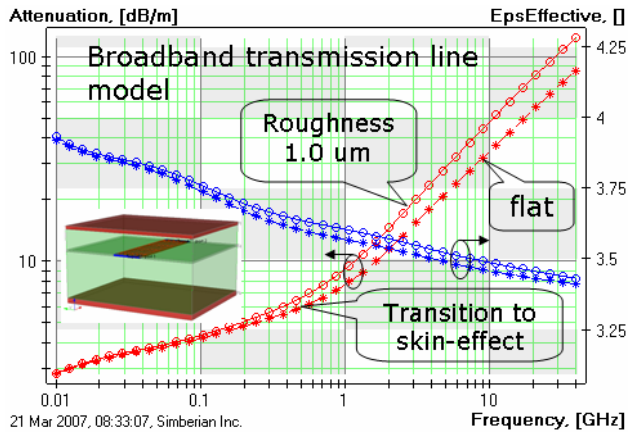
Causal and continuous over ultra-wide frequency band conductor interior models. Simbeor models trace metal interior with Trefftz finite elements to provide continuous analysis at low frequencies where current distribution in conductors is uniform, at medium frequencies where proximity and skin effects develops, and at high frequencies with well-developed skin and edge effects.

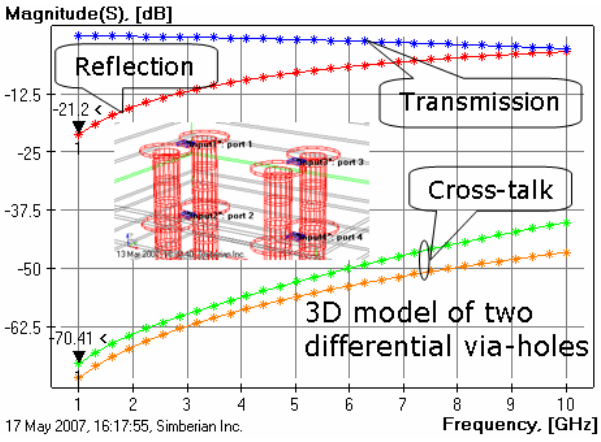
Metal surface roughness model. Metal surface roughness can significantly degrade signals in interconnects and Simbeor provides unique capabilities to model it with high accuracy. Typical PCB and package manufacturing processes produce strips with different roughness values on two sides of the same strip and Simbeor allows you to take it into account.

Simulation of conductor surface finish with multilayered metal. Some surface finishing processes use metals such as Nickel with parameters that can significantly degrade signals. Simbeor allows you to extract broadband parameters of transmission lines and discontinuities coated with any number of metal layers.

Automatic extraction of transmission line and periodic structure parameters. Simbeor automatically extracts complex modal propagation constants and characteristic impedances as well as frequency-dependent RLGC per unit length matrix parameters for lossy multiconductor lines and for periodic structures.

Automatic extraction of multiport parameters for discontinuities and via-hole transitions. The extraction process includes transmission line port calibration to increase accuracy and precise de-embedding of discontinuities in transmission lines. De-embedding allows you to build libraries of compact reusable S-parameter models.





Dozens of practical examples. Multiple comparisons with published calculated and measured data are provided. In particular, all benchmark examples suggested by J.C. Rautio have been passed successfully.

Simbeor 2007 Feature Summary and Prices

Feature \ License Level	L1	L2	L3
Design Creation Features			
Geometry editor with drawing capabilities and interactive 3D view	X	X	X
Transmission line and via-holes creation wizards	X	X	X
Fast differential via-holes impedance estimator and synthesis wizard		X	X
Single and differential lines synthesis wizards (*)		X	X
Post-Processing and Model Output Features			
Interactive 2D graphs to plot complex modal and RLGC parameters of t-lines	X	X	X
Interactive 2D graphs to plot complex terminal and modal S, Y and Z parameters of multiports	X	X	X
Parameterized solution spaces with unlimited number of parameters	X	X	X
Per unit length RLGC parameters of t-lines in SPICE W-element model format	X	X	X
S, Y and Z parameters of multiports in Touchstone format	X	X	X
T-line and multiport parameters in Excel format	X	X	X
3DML Electromagnetic Solver Features			
Unlimited number of signal and plane layers	X	X	X
Unlimited number of internal and t-line inputs/ports	X	X	X
Advanced magnetic current algorithm for plane layers with cut-outs for faster analysis of via-holes	X	X	X
Automatic processing of geometric symmetry (5 types) to accelerate analysis or increase accuracy	X	X	X
Bi-linear super-grid to accelerate simulation and preserve accuracy	X	X	X
Algorithm for thick metallization with vertical currents to increase accuracy for thick traces	X	X	X
Trapezoidal traces (effect of etching)	X	X	X
Causal one-pole and wideband Debye dielectric dispersion and loss models	X	X	X
Causal multi-pole Debye dielectric dispersion and loss models			X
Conductor interior models to account for broadband conductor loss and dispersion effects	X	X	X
Metal surface roughness model (two-side model)	X	X	X
Extraction of modal and per unit length RLGC parameters of multiconductor lines	X	X	X
Extraction of scattering and immitance parameters of discontinuities and via-holes	X	X	X
Absorbing boundary conditions to simulate radiating structures	X	X	X
Precise de-embedding of discontinuities and transitions in multiconductor lines		X	X
Multilayered conductor surface finish model		X	X
Periodically disrupted interconnects (serpentines, traces in perforated areas,…)			X

(*) – features to be implemented in update releases. Prices may change without a notice.
Online seminars and training classes, technical product support and software updates are included with any annual license of Simbeor.

For More Information

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