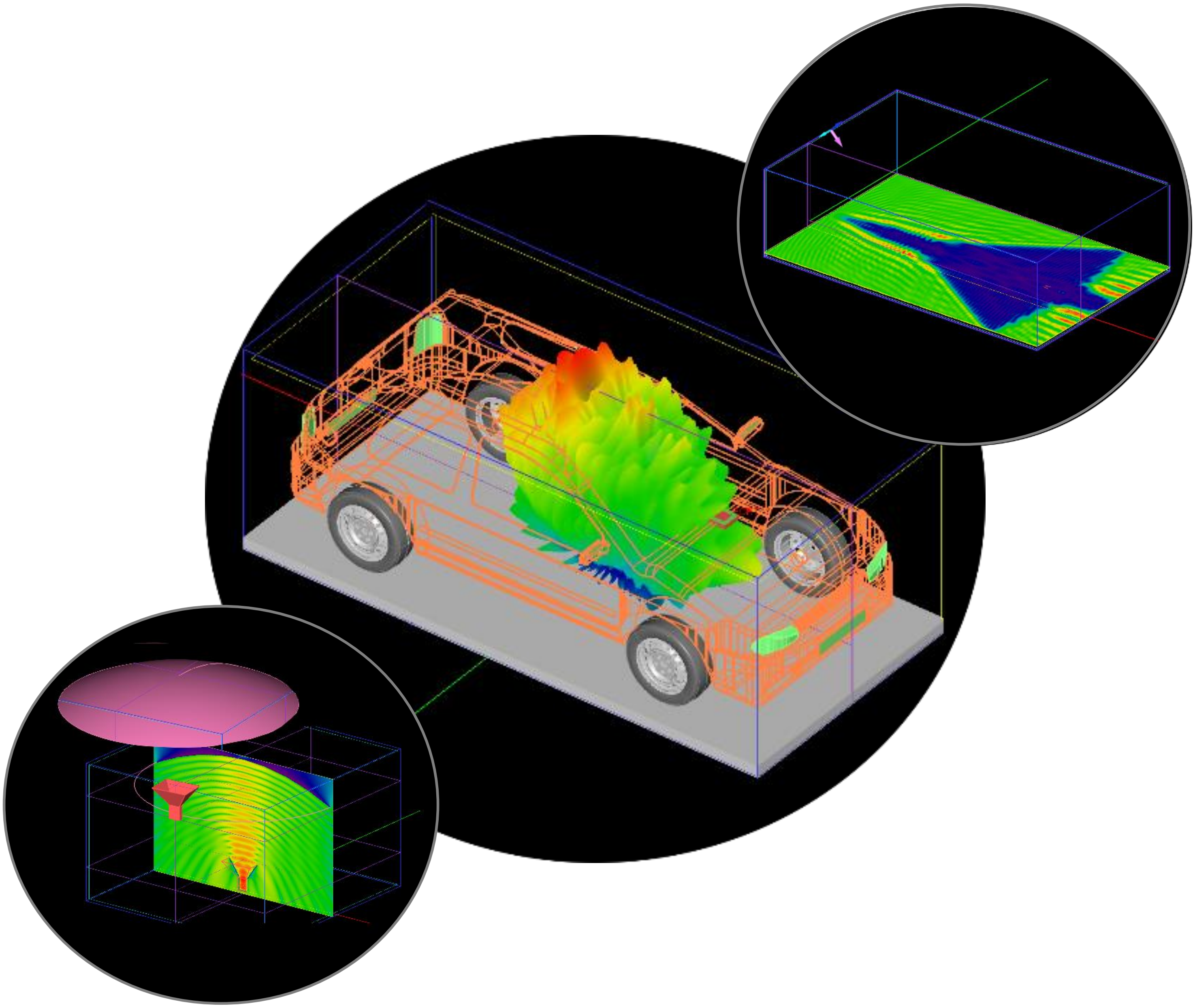
EM.CUBE®

Modular Integrated Multi-Scale Electromagnetic Modeling & Simulation Environment



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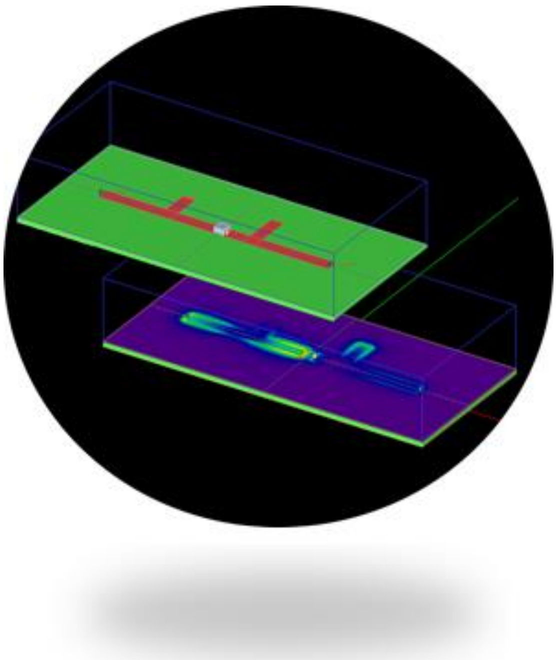
SIMULATING EVERYTHING FROM DC TO LIGHT

EM.Cube® is a visual software environment for 3D electromagnetic modeling. It consists of several tightly integrated computational modules with distinct simulation engines that can solve a wide range of electromagnetic radiation, scattering and wave propagation problems. Using EM.Cube, you can solve problems of different sizes and scales, varying from a few microns in MEMS devices to several square miles or larger in the case of urban propagation scenes.



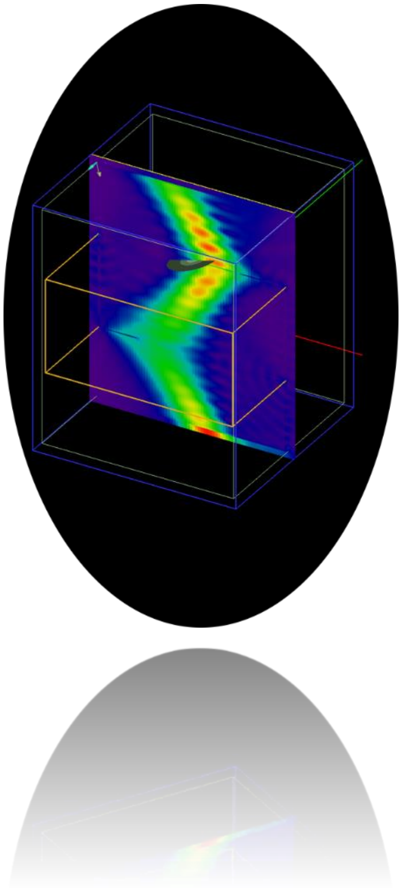
EM.Cube® has a modular integrated architecture with a streamlined user interface that is shared among all of its computational engines. Once you learn the basics of the software application, you will find enormous computational power at your fingertips. EM.Cube allows you to easily plan and execute complex, system-level simulations of multi-scale electromagnetic problems.

KEY FEATURES

- Fully parametric CAD modeling and geometry definition
- Time-domain and frequency-domain full-wave solvers for modeling radiation, scattering and wave propagation problems in complex media
- Asymptotic solvers for high-frequency modeling of large-scale structures and propagation scenes
- Static and quasi-static solvers for low-frequency modeling of lumped devices and multi-conductor transmission lines
- Versatile Python scripting environment
- Library of parameterized transmission line, antenna and propagation scene wizards for quick problem setup

APPLICATIONS

- Analyze directional communication links in high multipath urban environments
- Model large, finite-sized, antenna arrays on the transmitter and receiver ends
- Evaluate platform effects on the radiation characteristics of antenna systems
- Compute radar cross section (RCS) of complex targets and scatterers
- Design and optimize multilayer planar microwave and millimeter-wave circuits & devices
- Analyze complex metallic and dielectric waveguide structures for microwave and millimeter-wave applications
- Embed passive and active devices and Netlist-based circuits into your electromagnetic analysis
- Model frequency response of multiport structures and generate S-parameter data for equivalent circuit models or export to RF.Spice A/D
- Model transient propagation of complex arbitrary waveforms and signals in your circuits
- Investigate the interaction of incident plane waves and focused Gaussian beams with complex geometries, biological environments or dispersive and gyrotropic materials
- Study reflection and transmission properties of periodic surfaces and metamaterial structures



INTEGRATED MODULAR SOFTWARE

Whether you use EM.Cube to simulate a complex active phased array antenna on a large aircraft platform, or a focused Gaussian beam propagating through a left-handed metamaterial medium, or a small helical toroid coil, or a directional point-to-point communication link in a high multipath urban environment, all of your geometry input, simulation setup and data visualization and post-processing take place within the same intuitive visual software environment.

CubeCAD™ is a powerful parametric 3D CAD modeling framework that is shared among all of EM.Cube's simulation engines. You can easily move native objects or imported structures among the different modules for different types of electromagnetic simulation. You can perform full-wave simulations in either frequency or time domain, or low-frequency quasi-static analysis of small-scale lumped devices, or high-frequency asymptotic analysis of large-scale wireless propagation scenes. You can combine the simulation data from different solvers or use one of the built-in interfaces among various modules and simulation domains.

In spite of its sophisticated computational capabilities, EM.Cube is very easy to learn and use. Mouse-based, point-and-click tools together with a large library of reconfigurable Python-based wizards allow you to quickly draw simple native objects and assemble them together to construct and model complex real-life structures.

COMPUTATIONAL MODULES

EM.Tempo Full-wave time-domain FDTD simulator integrated with RF.Spice A/D's circuit solver for transient or wideband modeling of 3D electromagnetic structures, active & passive circuits, antennas, scatterers, metamaterials and other complex material media

EM.Terrano 3D polarimetric SBR ray tracer using ultrafast k-d tree algorithms for physics-based, site specific modeling of radio wave propagation in urban and natural environments

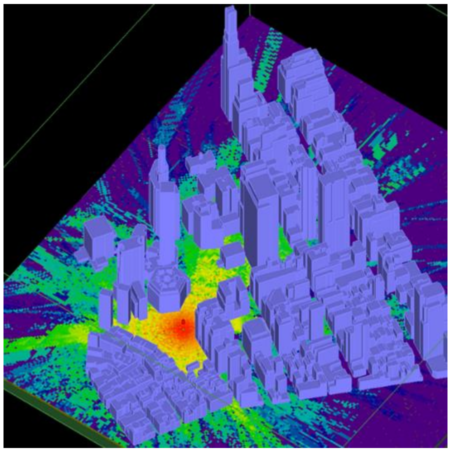
EM.Ferma Electrostatic, magnetostatic and steady-state thermal solvers for static or low-frequency analysis of circuits, lumped devices and transmission lines

EM.Picasso 2.5-D Method of Moments (MOM) solver for full-wave frequency-domain modeling of multilayer printed antennas, microwave circuits and periodic planar structures

EM.Libera Integral Equation (IE) surface & wire MOM solvers for full-wave frequency-domain modeling of 3D free-space structures

EM.Illumina Iterative Physical Optics (PO) solver for asymptotic modeling of electromagnetic scattering from large metallic structures and impedance surfaces

MULTIFACETED SIMULATION SUITE THAT GROWS WITH YOUR EVOLVING MODELING NEEDS



With EM.Cube's intuitive visual interface, you will be able to set up and successfully run your first electromagnetic simulation in less than a few minutes. This makes it particularly attractive as an effective teaching tool for electrical engineering courses and laboratories. Behind EM.Cube's user friendly façade, however, lie some of the industry's most sophisticated software feature sets including multi-objective Pareto genetic algorithms, high dimensional model representation (HDMR) algorithms for generating compact surrogate models, Huygens surface sources and observables for hybrid multi-engine simulations, full-scale Python scripting, and a host of GPU-accelerated and MPI-parallelized solvers. To see all of these for yourself, get a free evaluation license today and try out some of our many Wiki tutorials accessible from www.emagtech.com.

Technical Software Specifications	
Operating System	Min: Windows 8 - Recommended: Windows 10 Linux versions of simulation engines also available upon request
CPU	Min: Intel Pentium 4 or AMD - Recommended: Intel i7 or Xeon
Memory	Minimum: 4GB RAM - Recommended: 16GB RAM or more
Graphics Card & Display	Min: 128MB OpenGL Compliant & SVGA Recommended: 2GB NVIDIA Quadro & HD (1080 DPI)
GPU	CUDA-enabled NVIDIA (for GPU-accelerated FDTD solver only) Recommended: 6GB NVIDIA Tesla 2075
Multiprocessing Capability	Open-MP multicore for FDTD, SBR and PO solvers MPI for FDTD and SMOM solvers
Geometry Input	Native solid, surface and curve objects including NURBS strip and curve Point-and-click & drag-and-drop drawing and editing Object transformations including arrays and Boolean operations Python and equation-based curves and surfaces Discretized Polymesh objects
CAD Compatibility	Standard: STEP, IGES, STL, DXF, Facet, and Python import / export Terrain files: DEM
Mesh Generators	Uniform and adaptive Yee mesh (FDTD) Fixed-Cell rectangular grid mesh (Static) Surface triangular mesh (SMOM, WMOM, PO, SBR) Hybrid rectangular & triangular mesh (PMOM)
Simulation Engines	Multicore and GPU-accelerated FDTD, 3D-SBR, GO-PO & IPO, Planar MOM, Wire MOM, Surface MOM, Electrostatic FD, Magnetostatic FD and Thermal FD
Data Output	S/Z/Y parameters, VSWR, port voltages, currents and power, electric and magnetic near-field and current distributions, far-field radiation patterns and characteristics like axial ratio, radar cross section (RCS), energy and power densities, reflection and transmission coefficients and dispersion diagram of periodic structures, received power coverage and SNR maps, E_b/N_0 and BER, ray visualization, electric and magnetic potentials, static field integrals like capacitance and inductance, temperature and heat flux distributions