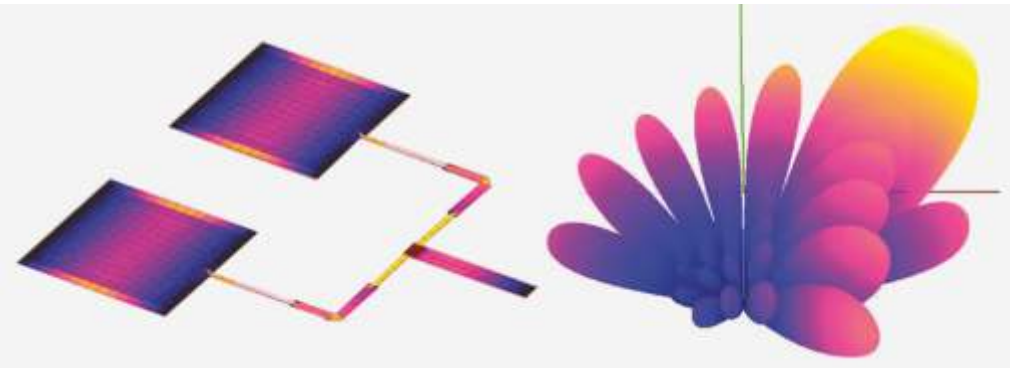
EM.CUBE
Modular Multi-Scale Multi-Engine Electromagnetic Simulation Suite



EM.Cube is a visual software environment for modeling and simulation of RF system engineering problems. EM.Cube's modular architecture is built on a core foundation that is shared among a growing number of integrated plug-in electromagnetic simulation engines featuring frequency domain and time domain, full-wave and asymptotic techniques. All of EM.Cube's computational modules are driven by a common, easy-to-use, streamlined user interface.

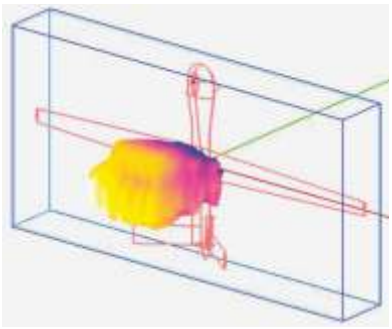
SPECIFICATIONS

- Full 3D parametric CAD modeling environment with import/export of external models (STEP, IGES, STL)
- Seven simulation engines: FDTD, Planar MoM, Wire MoM, Surface MoM, Static, Physical Optics & SBR
- Software / hardware accelerators like GPU, AIM, k-d Tree, and parallel multi-core implementations based on Open-MP and MPI
- Multivariable parametric sweeps subject to complex constraints defined through math expressions and/or Python scripts
- Multivariable reduced order model generation capability
- Classical and genetic algorithm (GA) optimizers including fast multi-objective Pareto
- Extensive 2D/3D data visualization, graphing, post-processing and computational utilities
- Unified interface and integrated environment for hybrid simulation of multi-scale problems requiring a combination of full-wave and asymptotic solvers
- Full Integration with EMAG's popular B2.Spice A/D RF Edition Including generation of S-parameter-based parts and devices

APPLICATIONS

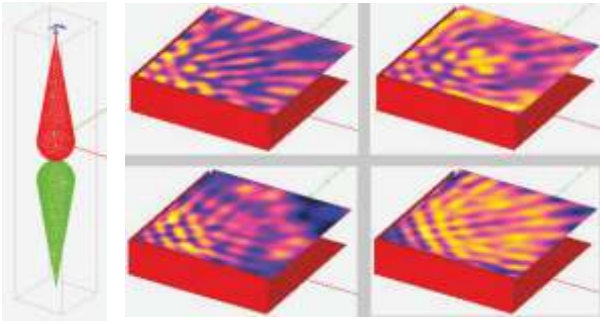
- Analyze directional communication links in high multipath urban environments
- Model infinite periodic or large, finite-sized antenna arrays
- Evaluate platform effects on the radiation characteristics of antenna systems
- Design multilayer planar and waveguide-based RF, microwave and millimeter wave circuits
- Embed passive and active devices and circuits into EM analysis
- Model transient propagation of arbitrary waveforms and signals in your RF circuits
- Investigate the interaction of plane waves and Gaussian beams with complex geometries and dispersive or anisotropic materials including biological media
- Study reflection and transmission properties of periodic surfaces and metamaterial structures
- Compute radar cross section (RCS) of complex targets with composite metal and dielectric parts and junctions
- Benchmarking environment for verification and validation (V&V) of different numerical techniques

EM.TEMPO (FDTD MODULE)



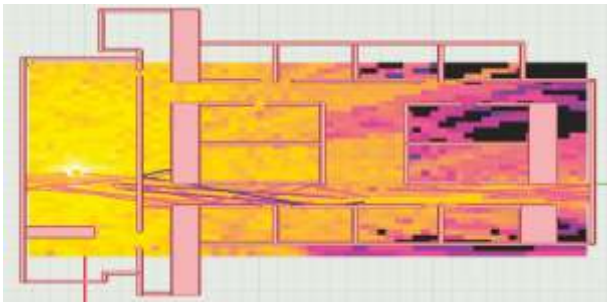
EM.Tempo is a powerful time domain electromagnetic simulator for full-wave modeling of 3D radiation, scattering and propagation problems. It features a highly efficient Finite Difference Time Domain (FDTD) simulation engine optimized for speed and memory usage. EM.Tempo brings to your desktop the ultimate in computational power. Its FDTD solver has been parallelized to take full advantage of multi-core processor and GPU architectures offering speed-up factors up to 50x. EM.Cube's FDTD Module can be used to model very complex geometries comprising a variety of lossy, inhomogeneous, anisotropic and dispersive materials. Besides fast wideband analysis, you can investigate the transient behavior of arbitrarily defined waveforms propagating in your circuits. Passive and active nonlinear devices can be embedded into your circuits. EM.Tempo provides a very efficient periodic structure simulator for analysis of metamaterials and periodic surfaces.

EM.Libera (MoM3D Module)



EM.Libera is a full-wave free-space structure simulator based on the 3D Method of Moments (MoM). It features two distinct simulation engines: a Wire MoM (WMOM) solver for wire-frame models of metallic structures, and a Surface MoM (SMOM) solver for arbitrary 3D surfaces and volumetric structures with combinations of metal, dielectric and composite parts. Besides providing a sophisticated surface mesh generator, EM.Cube allows easy import of external meshes in the STL format and connecting them to other meshed objects. The SMOM solver is fully parallelized for multiprocessor architectures and is further accelerated using the Adaptive Integral Method (AIM). EM.Libera can be used to analyze electromagnetic scattering from complex targets or radiation of 3D antenna and arrays in the presence of large-scale platforms.

EM.Terrano (Propagation Module)

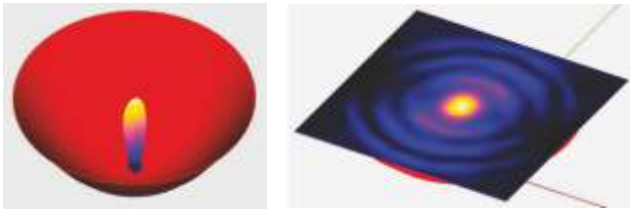


EM.Terrano is a physics-based, site-specific, wireless propagation modeling tool that enables engineers to quickly determine how radio waves propagate in urban, natural or mixed environments. It calculates the true signal characteristics at actual locations using physical databases of the buildings and terrain at a given site, not those of a statistically average representative environment. EM.Terrano's ray tracer is based on the Shooting-and-Bouncing-Rays (SBR) method, which combines geometrical optics (GO) with uniform theory of diffraction (UTD) models of building edges. The new SBR simulation engine utilizes k- d tree methodology to accelerate geometric computations by a factor of more than 50x. It performs a fully 3D polarimetric and coherent analysis of all the three vectorial field components at every point in the scene.

EM.Picasso (Planar Module)

EM.Picasso is a versatile planar structure simulator for modeling and design of printed antennas, planar microwave circuits, and layered periodic structures. Its simulation engine is based on the full-wave Method of Moments (MoM) using both Mixed Potential Integral Equation (MPIE) and spectral domain formulations. Planar MoM (PMOM) offers the ultimate modeling accuracy and computational speed for open-boundary multilayer planar structures with arbitrary numbers of metal layouts, slot traces, vertical interconnects and lumped elements interspersed in the substrate stack-up. You can use EM.Picasso to model large finite-sized antenna arrays as well as infinite periodic structures like frequency selective surfaces. You can also perform adaptive frequency sweep of multiport structures using highly accurate de-embedded sources.

EM.Illumina (Physical Optics Module)



EM.Illumina is a high requency asymptotic solver based on the novel Iterative Physical Optics (IPO) technique, which models electromagnetic scattering from large free-space metallic structures and impedance surfaces. IPO provides a computationally efficient alternative for large-scale scattering problems when a full-wave solution might become prohibitively expensive. Far more effective than the conventional GO-PO, EM.Cube's IPO solver captures multiple shadowing effects as well as multi-bounce scattering from complex surfaces. EM.Illumina is interfaced with EM.CUBE's other modules in a seamless manner through the concept of Huygens sources. These are based on Huygens surface current data that are generated by EM.Cube's full-wave simulators.