

Datasheet

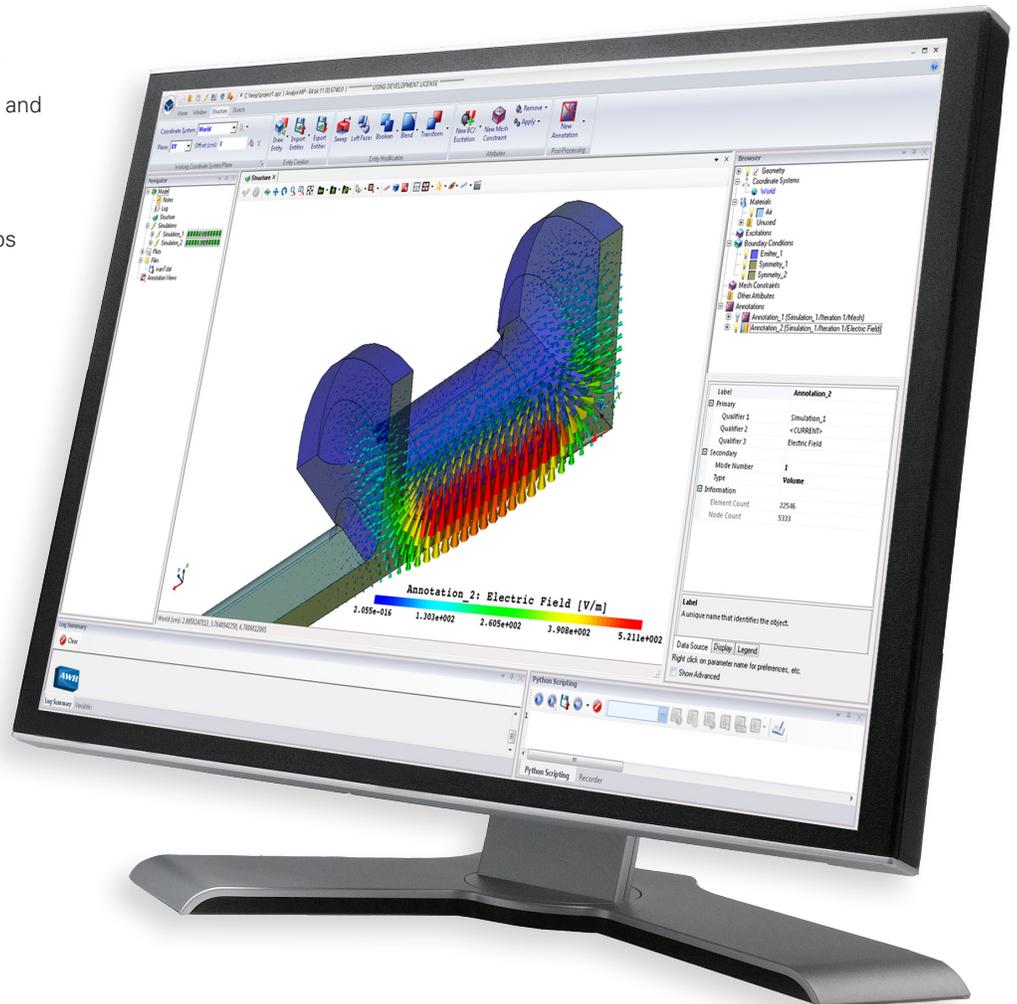
Analyst-MP 3D FEM EM for Multiphysics

Overview

Analyst-MP, leveraging the core capabilities of Analyst™ 3D finite element method (FEM) EM simulation and analysis software, targets big, multiphysics applications like particle accelerators. Analyst-MP solver technology is a result of decades of development in collaboration with the U.S. Department of Defense (DOD) and U.S. Department of Energy (DOE), where this powerful software is employed to analyze extremely complex high-frequency, multiphysics structures at nearly all U.S. national labs and accelerators.

Features at a glance

- Powerful layout/drawing editor: ACIS-based
- Proprietary FEM technology: direct and iterative solvers
 - 2D & 3D eigensolver
 - 3D electrostatic/magnetostatic
 - 3D full-wave driven frequency
 - 3D multipacting/particle tracking
- 3D volumetric meshing: automatic and adaptive
- Spectral decomposition
- Discrete and fast-frequency sweeps
- Complex material support: lossy, anisotropic, etc.
- Post-processing: results and visualization
- Parameterization and optimization
- MICHELLE (option): 3D finite-element gun and collector modeling code



What is Analyst-MP?

Analyst-MP software includes multiple solver technologies that include the following:

Magnetostatics

- Calculation of magnetic fields in the presence of linear and nonlinear media
- Coils and permanent magnet sources
- Applications include periodic permanent magnet (PPM) stacks and injector electromagnets

Electrostatics

- Calculation of electric and potential fields in the presence of linear dielectrics and conductors
- Applications include detectors and beam sources

Driven Frequency

- S-parameter and field calculations
- Wave and lumped ports
- Parallel – spectral decomposition
- Applications include RF feed systems, RF couplers, and radiators

Eigenmodes

- Unparalleled accuracy of modes in resonant structures
- Lossy materials, periodic and symmetry boundary conditions, PML, etc.
- User-specified conductivity for computation of power dissipation and cavity Q
- Quality factor, eigenfrequencies, shunt impedance, electric/magnetic/current density fields
- Applications include RF cavities and feed systems

Multipacting

- Prediction of resonant particles in the presence of RF fields computed in either eigenmode or driven frequency solve
- Parallel – particle decomposition
- Wide variety of particle statistics and particle trajectory post processing, including movies

Charged Particle Beam Optics [MICHELLE solver (Option)]

- Self-consistently computes the emission and transport of charged particles in the presence of electrostatic and magnetostatic fields
- 2D and 3D models for both equilibrium-flow particle trajectories and initial-value time-dependent beam trajectories
- Variety of emission models, including space-charge-limited, temperature-limited and field-emission, an extensive facility for secondary emission, volumetric ion source model, and a charge exchange model
- Applications include electron and ion beam sources, beam transport systems, and beam collection

