Engineers and scientists who design and model prototypes need fast and reliable field solutions. Today, simulation software allows professionals to design via computer simulations thereby reducing costs and risks associated with physical prototyping.

INTEGRATED Engineering Software is a pioneer in providing hybrid simulation tools for electromagnetic design analysis.

The Method of Moments (MOM) or the Finite Element Method (FEM) can be used to solve electromagnetic field (EMF) problems. For open region problems like antennas, the use of MOM is more appropriate, whereas FEM is adequate for closed region problems such as microwave cavities and networks.

Fast. Accurate. Easy-to-use.

- **Link to CAD packages** for true representation of complex geometric shapes
- **Powerful parametric solvers** allow designers to automatically vary and experiment with geometry, materials and sources – reducing the tedious, repetitive task of fine-tuning multiple design parameters
- **Easy to learn programs** let you focus on product development, not software training

INTEGRATED's simulation tools were developed specifically for engineers and scientists who design high frequency devices and components.

Our team of engineers and software professionals designed **SINGULA** to help solve a wide variety of high frequency EMF problems. **SINGULA** is a generalized hybrid method that combines the MOM with the Physical Optics (PO) technique, and the FFT method to speed up the matrix-vector multiplication.

The generalized hybrid method that combines MOM with Physical Optics, and the Fast Fourier Transform (FFT) method are also available for handling electrically large problems. Our software allows calculating the radar cross section of arbitrarily shaped conducting bodies coated by electrically lossy materials.

The resonance frequencies and field distribution of microwave cavities can be rigorously analyzed while impedance, admittance and scattering matrices of the high frequency networks can be directly calculated over a spectrum of frequencies.

Check our versatile tools, with 2D/RS and 3D analysis options.

INTEGRATED has developed powerful simulation tools that now allow the analysis of combined field effects, seamlessly.

Other advantages of INTEGRATED's simulation tools include:

- Only tool in the market that handles Highly Lossy Materials
- Use of Physical Optics (PO) along with the Moment Method
- Parametrics mode is ideal for studying model variation automatically
- Easy to import CAD drawings
- Built-in FFT solver, for electrically large problems
- Accurate calculation of near field distribution
- Field distribution with any arbitrary, free form geometry
- Excellent match when comparing software results with experimental results
- Lumped R, L, C components
- Advanced direct solver to deal with midsize problems
- Batch mode for defining and running unattended solutions
- The Integral Equation Method is an excellent approach to deal with open region problems
- Option of custom software modification – for customers with particular needs

Our technical team, staffed by scientists and engineers, will assist you in the selection of the tool that best suits your application needs.

TRY OUR SOFTWARE FOR 30 DAYS!

CALL FOR A **FREE EVALUATION** AND START IMPROVING PRODUCTIVITY TODAY.

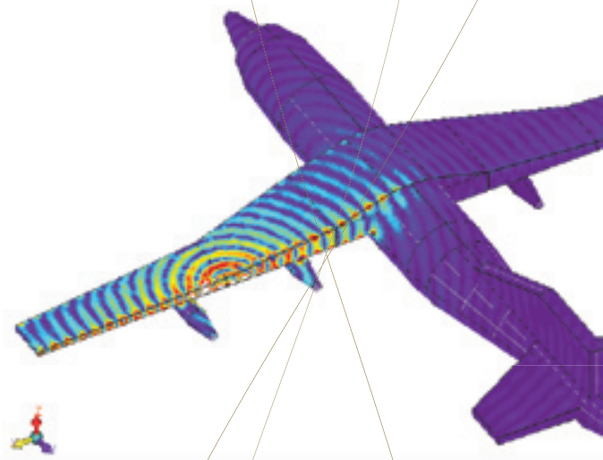
A **live demo** is also available.

INTEGRATED
ENGINEERING SOFTWARE

Call **1.204.632.5636**
E-mail **info@integratedsoft.com** or visit
www.integratedsoft.com

INTEGRATED

ANTENNAS, MICROWAVE CIRCUITS AND RADAR CROSS SECTION ANALYSIS SOFTWARE



Hybrid simulation tools for electromagnetic design analysis

How can INTEGRATED's simulation tools help you?

- Improve product quality while cutting engineering time and costs
- Reduce the product-to-market cycle
- Design a wide variety of electromagnetic field models
- Accurately analyze radiation patterns
- Precise analysis of other radiation characteristics of arbitrarily shaped antennas
- Analyze in detail horn antennas and reflector antennas covered by radomes
- Waveguide sources for open or closed region problems

Other applications include:

- Microwave circuit components (MMICs, RFICs, LTCC circuits, microwave/millimeterwave circuits, among others)
- Passive waveguide components
- Microstrip to waveguide transitions
- MRI RF coils
- Electromagnetic scattering from complex objects

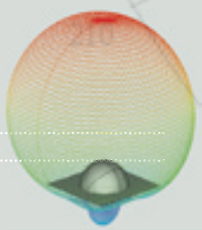
SOME APPLICATIONS

Antenna Radiation Characteristics

SINGULA computes the radiation characteristics of antennas of different types: linear antennas, microstrip antennas, dielectric resonator antennas, horn antennas, reflector antennas and others.

Our software can accurately calculate far zone radiation patterns of different components of electric and magnetic fields in the form of a 2D polar plot, a 2D rectangular plot or a full 3D plot. **SINGULA** calculates precisely the phase centre, input impedance and radiation efficiency of an antenna. The program also determines the power loss in a dielectric volume or the ohmic loss in a conducting volume.

SINGULA analyzes the effect of the presence of thin dielectric surfaces and/or thick dielectric volumes, arbitrarily shaped objects of finite and/or infinite conductivities on the radiation characteristics. Polarization characteristics such as axial ratio and tilt angle plots as a function of observation angle can be easily obtained.

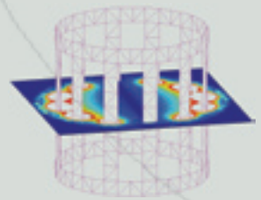


• 3D directive gain pattern of hemispherical dielectric resonator antenna

Near field analysis

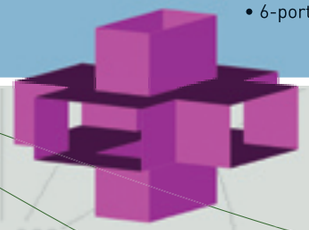
SINGULA accurately calculates near fields of antennas and of any other electromagnetic devices. There is no restriction on the distance from the antenna at which the near field analysis can be performed. The near field quantities are displayed as graphs, arrow plots or contour plots, based on the designer's preferences. Induced electric and magnetic currents on the material interfaces can be calculated, as well as Poynting vector distribution on an arbitrary surface.

Some examples: Bird cage coils for MRI applications and RF identification devices. Simulations can include lumped R, L, C elements in **SINGULA**.



• Electric field distribution in a bird cage coil

• Antenna used for radio frequency identification



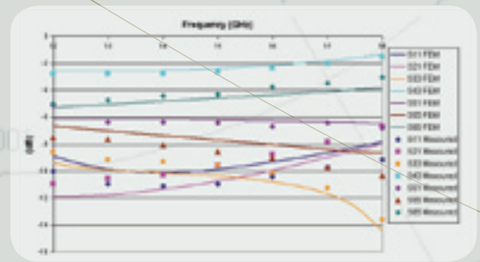
• 6-port waveguide junction

Microwave circuits

Impedance matrix (Z), admittance matrix (Y) and scattering matrix (S) of microwave circuits of multiple ports can be correctly obtained. The BEM or FEM techniques can be employed in microwave circuits made of waveguide elements.

The modal analysis and resonance frequencies of a microwave resonator can be easily calculated using FEM techniques in **SINGULA**, while the monostatic and bistatic Radar Cross Section of arbitrary conducting and/or dielectric bodies can be calculated using MOM.

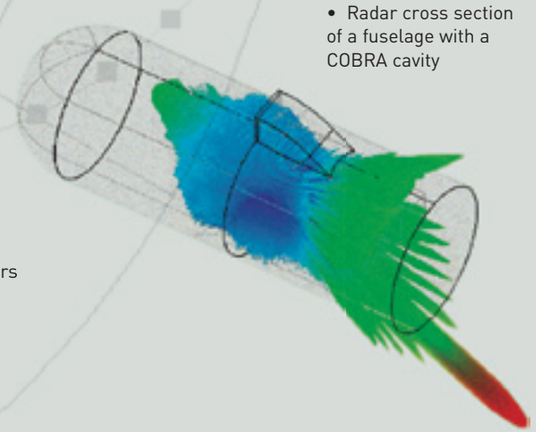
Our software includes the Fast Fourier Transform (FFT) method, for fast solution of electrically large antennas or objects.



• S-parameters of a 6-port waveguide junction as a function of frequency

Radar Cross Section

For the problems of Radar Cross Section (scattering problems or open region problems), the integral equation method has more advantages than the FEM or FDTD methods, especially for electrically large structures. **SINGULA** uses the FFT technique to speed up the matrix-vector product, which can overcome the weaknesses of the FEM method when dealing with highly lossy materials.



• Radar cross section of a fuselage with a COBRA cavity