CST STUDIO SUITE™ 2006

OVERVIEW

CST DESIGN ENVIRONMENT™

CST MICROWAVE STUDIO® | CST EM STUDIO™ | CST PARTICLE STUDIO™

CST DESIGN STUDIO™

CST Headquarters.

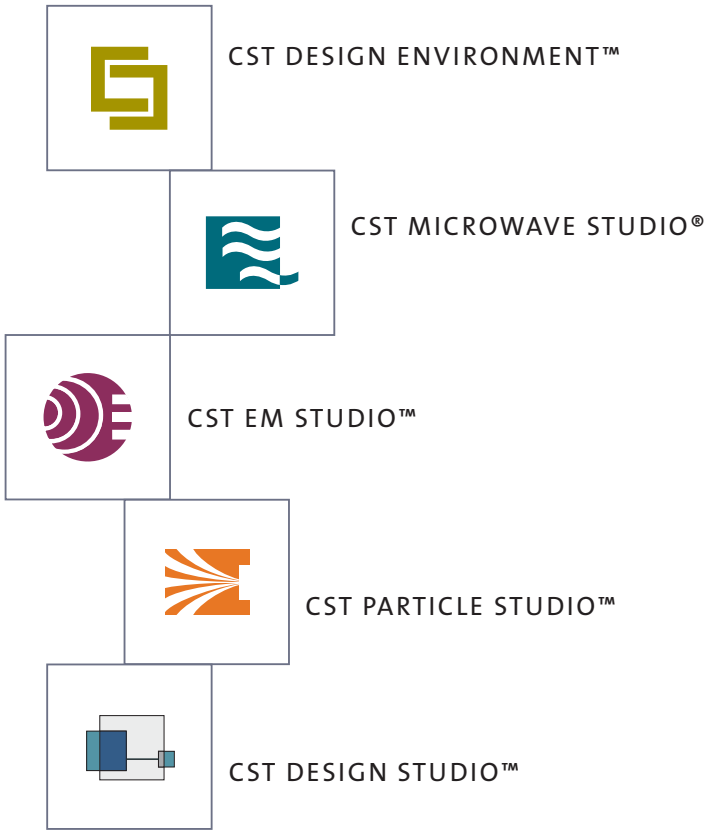
CST – COMPUTER SIMULATION TECHNOLOGY

Founded in 1992, CST today offers the market's widest range of simulation tools for electromagnetic field applications.

With ground-breaking technology, CST has continuously enhanced its position as market and technology leader in 3D EM Time Domain simulation.
With over 80 employees worldwide and a network of qualified distributors, 120 people are dedicated to the development and support of our EM products in more than 30 countries.

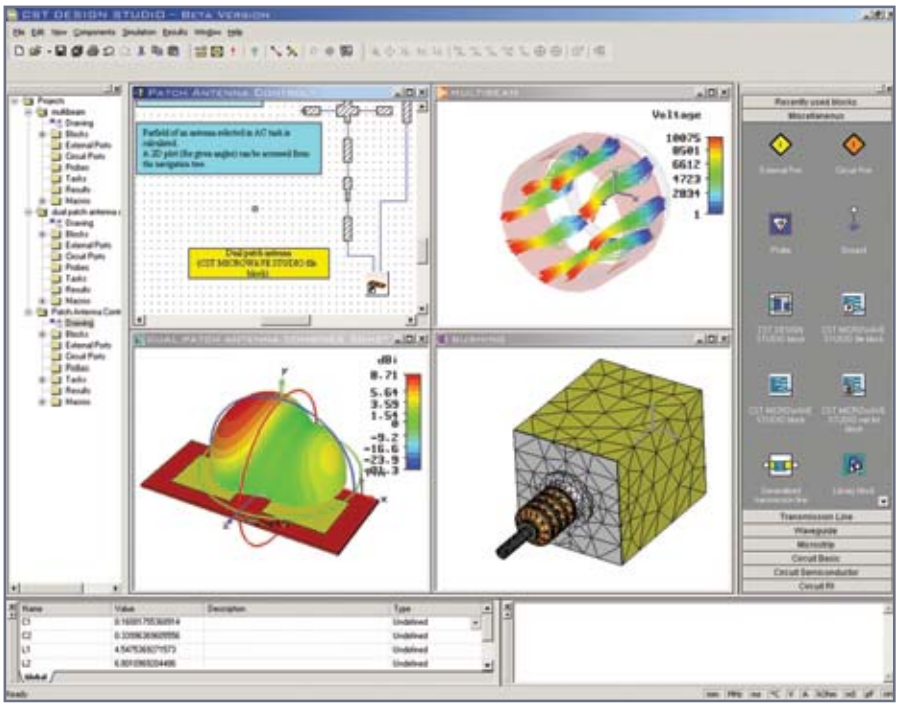
THE CST STUDIO SUITE™

CST STUDIO SUITE™ 2006 is the culmination of many years of research and development into the most efficient and accurate computational solutions to 3D electromagnetic designs.



- The access point to the CST STUDIO SUITE™.
- The tool for the fast and accurate simulation of high frequency applications such as antennas, filters, couplers, planar and multilayer structures, SI and EMC; in the Time and Frequency Domain [with cartesian and tetrahedral meshing].
- For the simulation of static or low frequency applications such as sensors, actuators, transformers, measurement instrumentation and shielding effects. Electro- and magnetostatic, current flow, eddy current and stationary temperature modules are available.
- This is a highly specialised product for the fully consistent simulation of free moving charged particles as in electron guns, cathode ray tubes, magnetrons.
- A versatile tool that facilitates the breaking down of large simulations into small parts, and 3D EM / circuit co-simulation.

THE CST DESIGN ENVIRONMENT™



Snap-shot of the CST DE graphical user interface demonstrating the versatility of solvers in the CST STUDIO SUITE®.

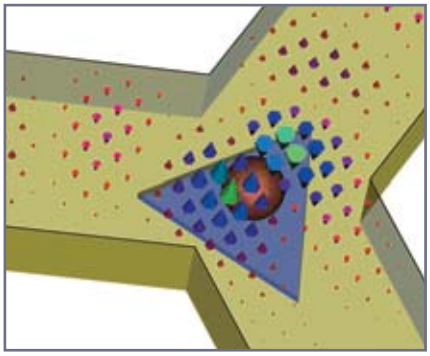
The CST DESIGN ENVIRONMENT™ [CST DE] is the access point to CST's palette of solver technology. It was developed in response to the increasing demand for coupled problems and co-simulation:

- Circuit /EM co-simulation.
- Thermal analysis of electric losses.
- Charged particle tracking through static and eigenmode fields.
- Magnetostatic analysis of current flow fields.
- ...

This easy-to-use graphical user interface is common to all of CST's 3D simulators. CST DE's multiple document interface allows users to open several models in one front-end.

Users of CST MICROWAVE STUDIO® [CST MWS] are offered two views of their structures: the traditional 3D view of the geometry and a schematic view.
In the schematic view terminals are used to represent all ports and modes. This allows a 3D structure to be embedded extremely quickly in an RF/MW circuit scheme. It is additionally possible to break down 3D structures into small parts, re-linking the segments in the schematic view.
This can save a tremendous amount of time especially for the optimization of complex structures.

The inbuilt optimizer can work with parameterized models across the borders of methods. Using VBA, macros can be defined which steer different solver runs from a central point. A job control center helps the management of projects.

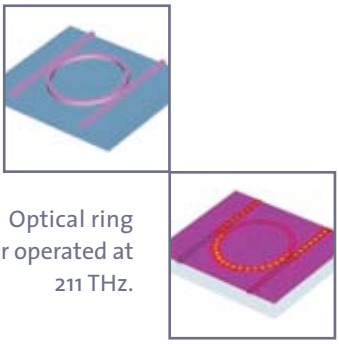


- CST MWS can consider frequency dependent and even magnetized ferrite material properties. Shown [left] is the electric field distribution in a Y-junction circulator at 72.5 GHz.

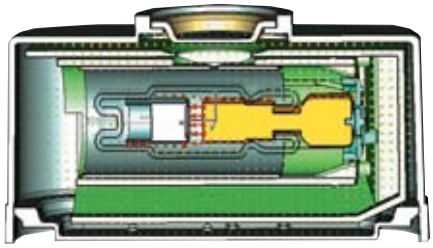
Results are in excellent agreement with E.K.N. Yung et al., IEEE Trans. Microwave Theory Tech., 1996.

» CST STUDIO SUITE 2006 facilitates the simulation of coupled problems including all kinds of electromagnetic and thermal analysis in an unprecedented way. The CST tool is truly unique and undoubtedly the most complete 3D EM simulation package on the market.«

Eiji Tanabe, Ph.D., President of AET Japan, Inc.



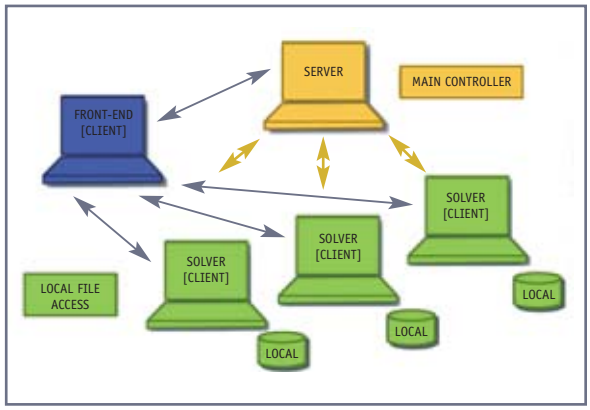
Optical ring coupler operated at 211 THz.



Electrostatic analysis of an X-ray tube, imported through the STEP interface.

»By the way, for as much as I complain at times, I am an extremely happy user of your software, and I commend you and your team for the tremendous job that you have done. My company is small and MWS is a significant investment. It has proven to be a worthwhile investment and continues to amaze me. It has allowed us to optimize some new interconnect designs out to 35 GHz, and has shown extremely high correlation to our measurements. Your software has given me a definite edge over other consultants and many large corporations.«

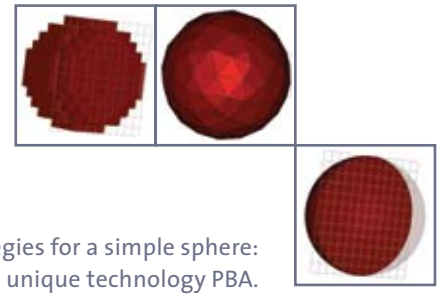
Scott McMorrow, Teraspeed Consulting



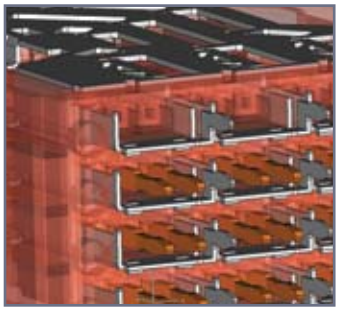
■ CST's distributed computing scheme enables users to take advantage of available cpu-power in the company network without the need for full stand-alone licenses on individual machines. This system delivers a quasi-linear speed-up with the number of participating computers.

PERFORMANCE AND ACCURACY...

One of CST's major competitive advantages is based on the proprietary Perfect Boundary Approximation [PBA]® technology. Whereas the staircase grid is pretty efficient for a large number of mesh cells, it does have a major drawback when it comes to the geometrical approximation of rounded structures. Tetrahedral meshing has more or less the opposite strengths and weaknesses. PBA combines the advantages of both standard approaches, and offers a superior solution for most applications.



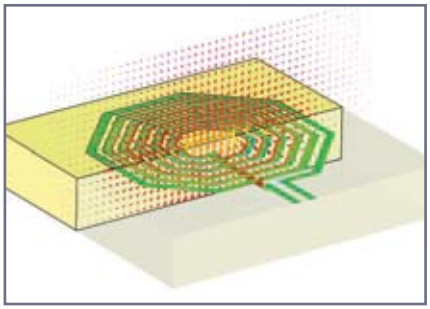
Various meshing strategies for a simple sphere: staircase, tetrahedral, and CST's unique technology PBA.

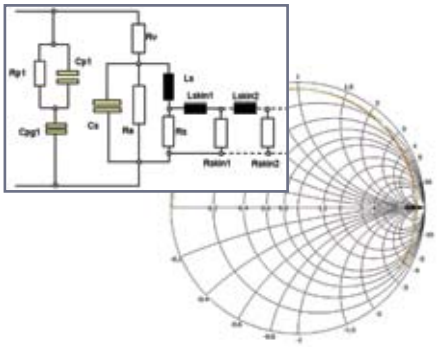


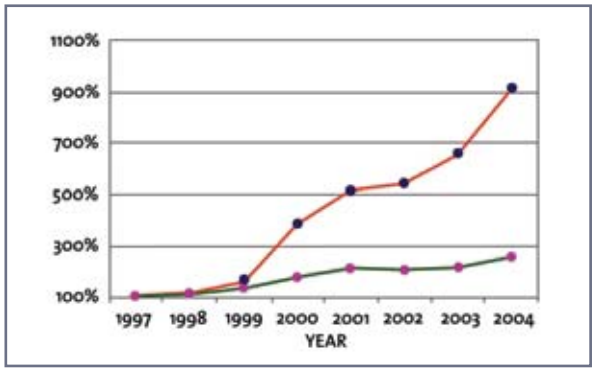
»The ERNI Ermet zeroXT connector is able to transmit differential signals up to a data rate of 10 Gbit/s [of a non-return zero code]. The complete design support, including the electromagnetic field analysis, the impedance calculation and the crosstalk analysis, was done using CST MICROWAVE STUDIO®. Due to the accurate results, the connector could be manufactured, without a major re-design, in one pass.«

Dr. Thomas Gneiting, AdMOS

Broadband passive equivalent SPICE circuit models – shown here for a planar inductor – can be created from 3D simulations using either a transmission line or an MOR approach.







Estimated Revenue Increase – CST vs. 3D EM Competitors.

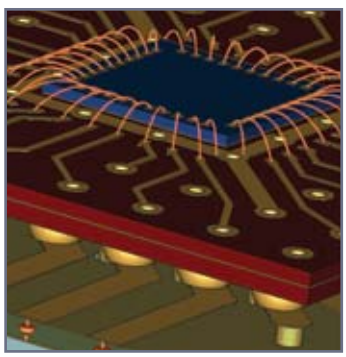
...FOUNDATIONS OF CST'S SUCCESS

CST MICROWAVE STUDIO®

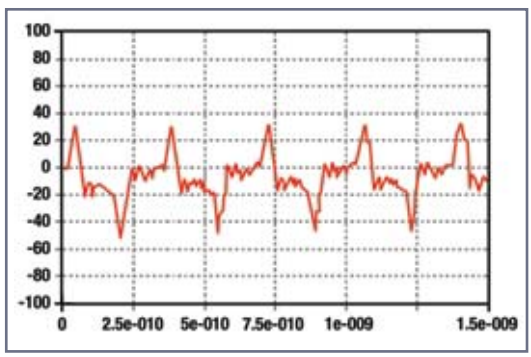
Since its inception in 1998, our flagship product, CST MICROWAVE STUDIO®, has become renowned for its easy to use graphical interface and modeling abilities. It has remained the leading industry example of how to make 3D simulation easy and efficient. CST successfully introduced the proprietary technology: Perfect Boundary Approximation [PBA]®. The significance of this method's technical merits can be seen in the economic development of the company.
Today, CST enjoys a dominant position in 3D EM Time Domain and a market share of over 30% of the entire High Frequency 3D EM simulation market.

»A Trivec Avant blade monopole antenna was modeled using the CAD system in CST MWS and monitors were set up to obtain gain patterns from 950 - 1220 MHz. Since this particular antenna is several wavelengths in this band [i.e. too long], the radiation patterns have several lobes. With slightly over one million mesh cells, the calculated radiation patterns were extremely accurate when compared to data measured on our antenna range. […] Trivec Avant Corporation would like to thank CST for providing such an excellent tool which saves countless hours of time and labor. […]«

John Fenick, Electrical Engineer,
Trivec Avant Corporation

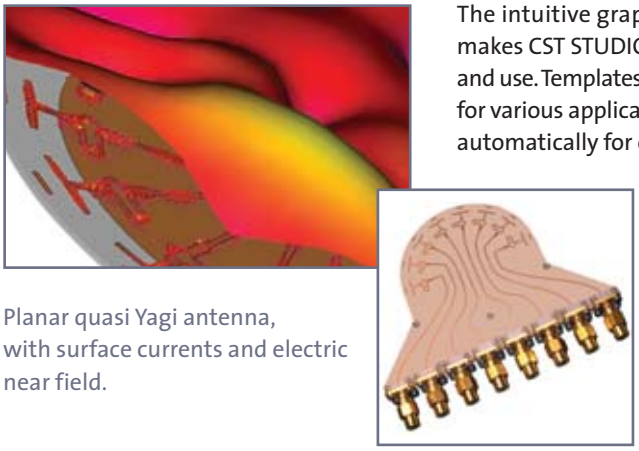


Simulation of the electric field radiated from a package mounted on a Ball Grid Array. The Time Domain approach also allows TDR analysis of the signals propagating along the traces, vias, and bond wires.



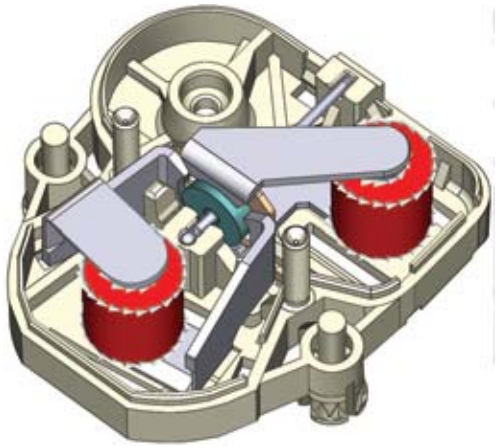
Probe Time Signals in V/m.

STREAMLINING YOUR WORKFLOW...



Planar quasi Yagi antenna, with surface currents and electric near field.

The intuitive graphical user interface makes CST STUDIO products easy to learn and use. Templates help set up simulations for various applications, evaluating results automatically for comprehensive analysis and automatic optimization.



Stepping motor with gear box imported using the IGES interface.

... USING THE BEST IN CLASS

»CST MICROWAVE STUDIO® is redefining the way we work. Never before had we anticipated having such flexibility at our fingertips from a 3D EM simulation package. The software adapts to a large array of problems and scenarios.[...]
CST MICROWAVE STUDIO® has turned out to be the most versatile and powerful 3D EM simulation tool we have ever used. Furthermore, an extremely helpful and knowledgeable staff backs up this package.«

Frederic Lecuyer,
RF Antenna Design Engineer

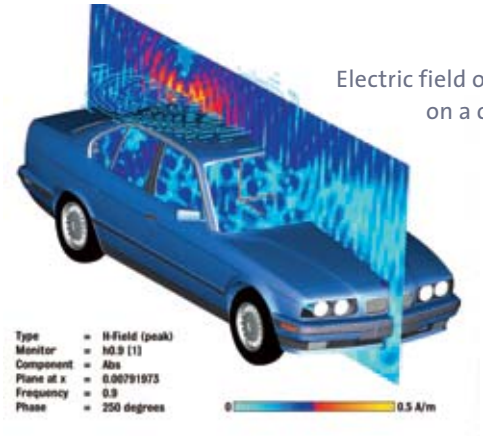
The Agilent / CST alliance, formed in 2004, today enables fully automatic 3D EM/Circuit Co-Simulation and Co-Optimization between Agilent ADS and CST MWS:

»This latest development provides tight integration between the Advanced Design System platform and the technology leader in 3D EM simulation.
Co-simulation will save a huge amount of valuable working time of design engineers who no longer need to shuffle result data manually back and forth.«

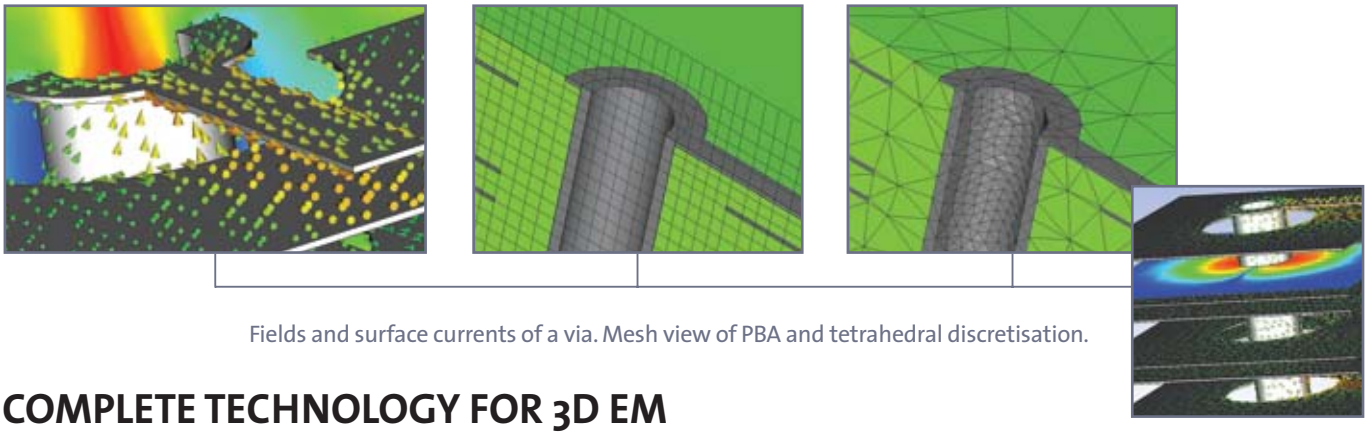
Charles Plott, Director of Marketing,
Agilent EEsof EDA

CST has consistently promoted the best-in-class approach. Rather than trying to offer our customers everything from a one-stop shop, we have chosen to focus on developing 3D EM software, establishing straight-forward, easy-to-use links with other best-in-class vendors, uniting all available expertise.
CST STUDIO products are designed to be embedded in your workflow.
A wide range of import/export filters enable the easy exchange of geometrical data with CAD tools. Special interfaces with Cadence® for signal integrity analysis and Agilent ADS for EM/circuit co-simulation enhance and unite the capabilities of different worlds.

The import and export of structural information is fundamental to the embedding of a simulator in a design flow. A sophisticated healing procedure to repair defects that result from the transfer between different programs is vital to its success. Available within the CST STUDIO SUITE™ are:
Standard DXF, Extended DXF, GDS II, Gerber, Agilent ADS layouts, SAT, STL, IGES, STEP, CATIA® v4, CATIA® v5, PRO-E®, Autodesk Inventor®, VDA-FS, Cadence Allegro®/APD, biological voxel data, ...



Electric field of an antenna placed on a car roof at 900 MHz.



Fields and surface currents of a via. Mesh view of PBA and tetrahedral discretisation.

COMPLETE TECHNOLOGY FOR 3D EM

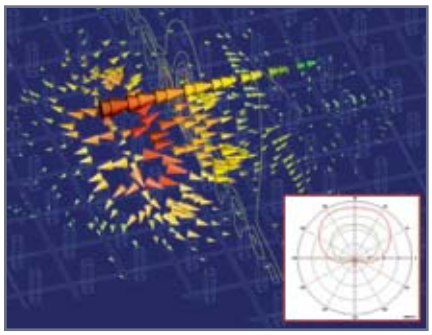
CST MWS is the first commercial 3D EM code to unite Time and Frequency Domain [with cartesian and tetrahedral meshing] solvers within the same easy-to-use interface. By providing complete technology for 3D EM, CST enables the engineer to choose the right tool for the right job, within one package.

The CST STUDIO SUITE® provides an extensive range of solvers adapted to a wide band of applications in 3D EM simulation:

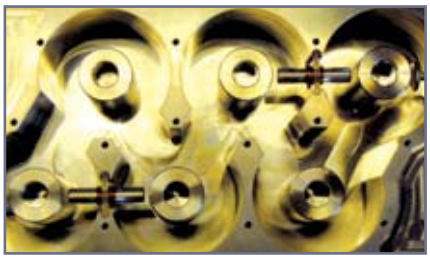
- HF Time Domain
- HF Frequency Domain
- Eigenmode
- Model Order Reduction
- Modal Analysis
- Low Frequency Frequency Domain
- Electrostatics
- Magnetostatics
- Current Flow
- Stationary Temperature
- Particle Tracking

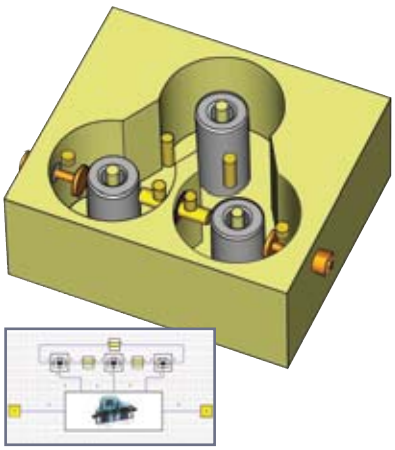
» I often need to analyze ultra broad band antennas, phased arrays, curved radomes and microstrip/stripline/waveguide RF components. For these applications, the Time Domain solver is extremely fast and very accurate when compared with measured data and other accurate solvers. I believe that it is the very best in the world. For design and analysis of electronic scanning phased arrays, meanderline polarizers, frequency selective surfaces, the Floquet mode Solver in the Frequency Domain Solver often provides fast accurate answers.«

Mike Maybell,
Planet Earth Communications

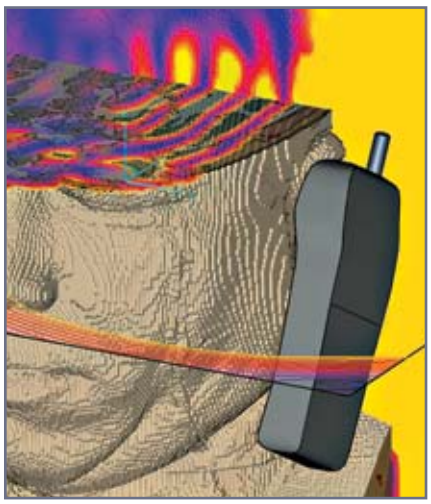


Vector plot of the current density of a wire antenna over a photonic bandgap structure.





Cascaded Triplet Filter simulated with CST MWS.
CST DESIGN STUDIO® can additionally be used to co-simulate the influence of discrete capacitors for tuning purposes.



EM fields of a mobile phone propagating through a high resolution human head model [HUGO]. The SAR analysis can indicate if a mobile phone conforms with international standards and regulations.