Installed antennas can strongly interact with their host platforms, significantly altering the antenna’s performance. **Savant** is asymptotic high frequency electromagnetic (EM) analysis software, providing fast and accurate prediction of antenna performance as installed on platforms that are tens to thousands of wavelengths in size.

In addition, to predicting installed far-field radiation, Savant computes installed antenna-to-antenna coupling, and near-fields. The Shooting and Bouncing Ray (SBR) asymptotic technique is used to rapidly and accurately predict antenna performance on electrically large platforms, using modest computer hardware. Full-wave 3D EM simulation results for isolated antennas can also be used to develop hybrid SBR simulations in Savant for increased antenna modeling fidelity.

**SBR Technology Leaders**
ANSYS is a worldwide leader in the SBR technique for electromagnetic simulation and analysis. In recent years, we have advanced the state-of-the-art in SBR technology; adding several new physics models that cannot be found in other commercially available SBR tools such as creeping waves, UTD diffraction rays and surface curvature extraction.
Intuitive User Workflow
Available for Windows or Linux, the Savant graphical user interface (GUI) provides a complete framework with a logical and ordered workflow from model import to analysis output. Problem setup and analysis settings are organized in an intuitive graphical folder tree. After computation is completed, all results are accessible in the results tree and can be quickly rendered in 3D, polar and rectangular formats.

The Savant GUI allows the user to view full 3D field patterns, properly oriented and placed on the host vehicle CAD model. Polar plots provide overlays of the vehicle CAD model on the results, with proper relative orientation for the displayed pattern cut to provide context and insight.

Realistic Platform Models and Materials
Savant operates on detailed 3D CAD models of the antenna's host and environment. The surfaces of the 3D CAD models can be defined as a combination of metal, absorbers and layered material coatings. Savant supports a variety of faceted CAD formats as well as IGES (NURBS) models. Through the GUI the user can build up complex scenes consisting of multiple CAD models and assign unique articulation to individual parts.

Visual Ray Tracing and Ray Diagnostics
SBR, creeping wave and UTD edge rays can be displayed before or after analysis as they would be computed in the Savant engine. The Visual Ray Trace (VRT) feature provides helpful information in understanding ray bounce mechanics, sources of pattern nulls or peaks, Geometrical Optics (GO) blockage, and ray densities for a given angle of target illumination.

Hybrid Simulation with Full Wave
Full-wave 3D field solver results for isolated antenna definitions can be imported from ANSYS HFSS simulations and used to excite Savant's SBR simulation through application of the Equivalence Principle. Integration with popular commercial fullwave EM tools enables a smooth import of complex free-standing antenna models based on time or frequency domain volume meshing or surface meshing techniques. Savant complements your existing full-wave EM software tool, taking precise results of isolated antenna simulations and capturing their installed performance on full size aircraft, ships, vehicles or buildings with speed and accuracy.
Efficient Simulation
Savant’s solver is optimized for parallel processing on multi-core CPUs, providing a near linear speedup with each additional core. With Savant HPC capability, you can use the graphics processing unit (GPU) on one or more NVIDIA graphics adapters to leverage further parallel processing to reduce simulation times up to 100x or more on a single workstation.

Need even faster simulations? Savant- HPC Tokens also enable MPI computing across multiple computers so you can leverage the power of neighboring computers or high power computing (HPC) clusters to massively accelerate simulation time.

A Complete Installed Antenna Analysis Environment
Savant is a powerful and modern installed antenna simulation software tool based upon the proven SBR technique. With the advanced GUI, post-processing capabilities and built-in diagnostic features, you can characterize the antennas placed on your large and complex vehicles with confidence.
Savant Feature Detail

- Savant computes:
  - Installed radiation patterns
  - Coupling between Tx/Rx antenna pairs
  - Spatial E & H field distribution (near-fields)
  - Incident, scattered and total fields
  - Co-pol and cross-pol radiation and scattering
- Sophisticated GUI for setting up, running and interpreting Savant simulations.
- Advanced plotting capabilities including built in Cartesian and Polar plots with CAD overlay feature.
- Extensive Help documentation including several tutorials.
- Savant's multi-core parallelized engine accounts for all important effects, including diffraction, general optics (GO) blockage, and GO multi-bounce.
- Savant is the only commercially available SBR software to include a Creeping Wave model, which is very important for accurate shadow region predictions on bodies with surface curvature.
- Physical Theory of Diffraction (PTD) wedge correction feature for correcting PO currents along edges
- Models Uniform Theory of Diffraction (UTD) edge diffraction rays created by illuminated geometry edges. Important for accurate shadow region prediction.
- Divergence factor correction included for accurately simulating curved surfaces in facet CAD or IGES models.
- Harnesses high-volume parallel processing available in NVIDIA Graphics Processing Units (GPU) to accelerate simulations by up to 100x.
- Visual ray trace feature for aiding the analyst in understanding the ray interactions with the platform. Ray filter to specific far-field and near-field observation points supported.
- Imports 3D CAD models to define the platform or environment for Savant simulations.
- Support for a variety of CAD formats including IGES, ACAD Facet, Stereolithography, Wavefront OBJ and Gmsh.
- Multiple installed antennas defined by 3D free-space patterns or current distribution.
- Streamlined workflow for integrating full-wave antenna models from Ansys HFSS and other commercial CEM tools for high-fidelity hybrid installed antenna analysis.
- Library of parametrically defined antennas including common antenna types such as monopoles, dipoles, directive beam, loop, slot, horns, etc.
- Support for modeling antennas as far-field radiation patterns or as current sources. Current source models are necessary when the antenna is electrically close to a surface.
- Ability to define and simulate phased array antennas. Array definitions include array shape, element spacing, element type, beamsteering angle and sidelobe level tapering through amplitude weighting.
- GUI provides the ability to define and place antennas interactively in the CAD interface.
- Free space antenna formats can be narrowband or wideband (i.e., multi-frequency).
- Multi-layer material models for penetrable materials such as coatings, radomes and walls.
- Smart power normalization feature.
- Dynamic zoning feature for major acceleration of computations involving many current sources.

If you’ve ever seen a rocket launch, flown on an airplane, driven a car, used a computer, touched a mobile device, crossed a bridge or put on wearable technology, chances are you’ve used a product where ANSYS software played a critical role in its creation. ANSYS is the global leader in engineering simulation. We help the world’s most innovative companies deliver radically better products to their customers. By offering the best and broadest portfolio of engineering simulation software, we help them solve the most complex design challenges and engineer products limited only by imagination.

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