STRUCTURES

Ansys HFSS SBR+

Ansys HFSS SBR+ is an asymptotic high-frequency electromagnetic (EM) simulator for modeling EM interaction in electrically large environments. It employs the shooting and bouncing ray (SBR) technique for rapid computation of EM solutions. HFSS SBR+ computes installed antenna performance, extended near-field distributions, far-field radiation patterns and radar signatures for electrically large platforms with minimum computational resources.

Isolated antenna simulations from Ansys HFSS can be used in hybrid HFSS SBR+ simulations to assess the antenna interaction with its host and environment. HFSS SBR+ extends the SBR method by overlaying advanced diffraction physics such as physical theory of diffraction (PTD), uniform theory of diffraction (UTD) and creeping wave (CW) physics for enhanced fidelity. Multicore CPU, message passing interface (MPI) and graphic processing unit (GPU) acceleration features enable significant analysis time reduction.

/ Installed Antenna Examples in HFSS SBR+

Antennas operating on large host platforms can experience significant performance degradation due to EM interaction with the host structure. The installation placement of the antenna, as well as coupling to other antennas on the same platform or in the local environment, will significantly affect the overall efficiency of the wireless communication or radar systems that these antennas service. Installed antenna applications, such as antennas mounted on ships, aircraft, buildings or ground vehicles, plus dynamic complex environment scenarios involving several vehicles, can be simulated and studied in Ansys HFSS SBR+. HFSS SBR+ is critical to assess and improve installed antenna designs and ensure that the communication or radar systems perform as expected for safety and required functionality of these vehicles.

Here's a glimpse of some large-scale installed antenna applications in HFSS SBR+:

- HFSS SBR+ technique builds on SBR with advanced diffraction physics to accurately model antenna performance when mounted on curved structures such as an aircraft.
- HFSS SBR+ can be applied to advanced simulations of automotive radar sensors in complex dynamic scenes like busy intersections, congested turnpikes or toll collection areas.
- When mounted on heavy industrial and agricultural equipment, antenna performance can be accurately characterized.

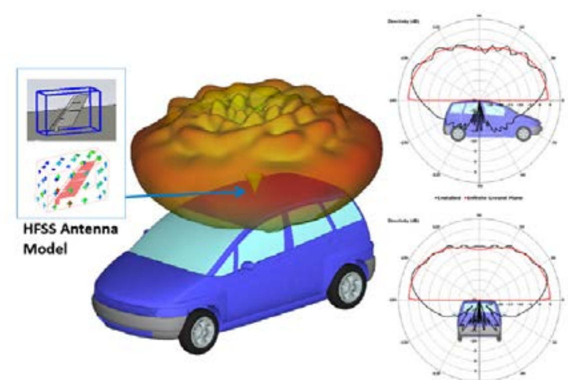

Figure 1. Installed antenna performance in Ansys HFSS SBR+.

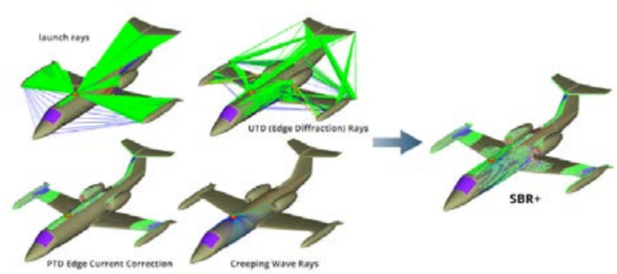

Figure 2. Different physics in SBR+ as applied to an aviation communication system.

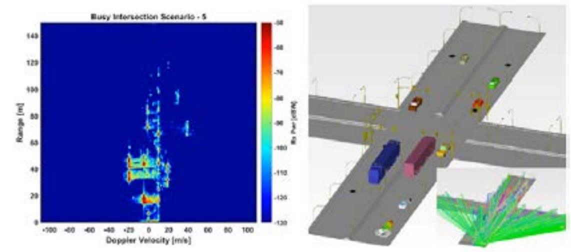

Figure 3. Busy intersection scenario.

- HFSS SBR+ ushers in a modern era of large-target radar signature and radar cross section (RCS) modeling in Windows and Linux. HFSS SBR+ simulations can be used to generate inverse synthetic aperture radar ISAR images to locate significant centers of scattering across complete targets.
- HFSS SBR+ can characterize signal power between devices across a smart home and also analyze the impact of the complete scattering environment on performance.

/ Key Features of Ansys HFSS SBR+

- Computes installed radiation patterns, antenna-to-antenna coupling, spatial E and H field distribution for co- and cross-polarized radiation and scattering.
- Accounts for critical large-scale interaction effects, including diffraction, blockage and multibounce.
- Provides advanced diffraction physics, including PTD wedge correction, UTD edge diffraction ray sources and creeping wave physics for high-fidelity scattering in shadowed regions.
- Accelerates simulation 100X using NVIDIA GPU devices, with multicore central processing unit (CPU) parallel processing and message passing interface (MPI) distributed computing.
- Provides insight into ray interactions with scattering geometry using its visual ray trace (VRT) utility. Ray filter to both far-field and multiple near-field receiver points are supported.
- Models multilayer penetrable materials with losses to model radomes, windshields, walls and other partially transmissive surfaces.
- Provides an efficient high-frequency analysis process when integrated within the Ansys Electronics Desktop for model development, analysis and post-processing of SBR+ simulations.

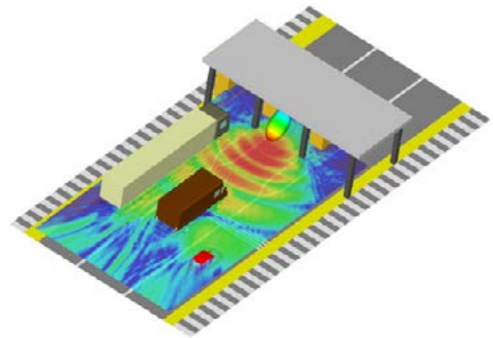

Figure 4. Busy toll collection area.

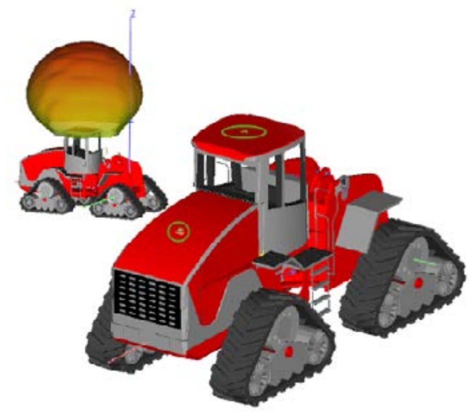

Figure 5. Antenna mounted on a tractor.

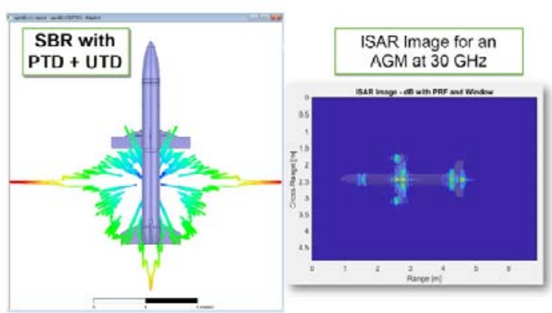

Figure 6. Advanced diffraction physics and ISAR image generation capabilities.

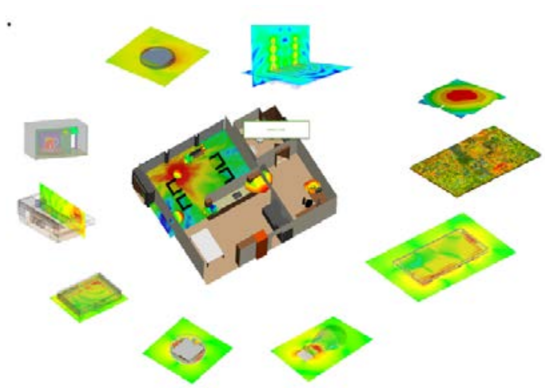

Figure 7. Smart home.

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