IMACS

ASERIS-BE™

Questions & Answers

Q&A on ASERIS-BE™

1. What is ASERIS-BE™?

ASERIS-BE™ is a high-performance simulation software developed by Airbus and IMACS for Electromagnetic applications, dedicated to the numerical solution of Maxwell's equations in the frequency domain. It is based on the Boundary Element Method and implements fast solvers such as the Fast Multipole Method and the H-matrix method. Electric and magnetic fields are calculated dynamically during post-processing, offering flexibility and reduced computational time.

2. Why was ASERIS-BE™ developed?

ASERIS-BE™ for computational electromagnetics was initially developed to serve the needs of the different Airbus Business Units for design, certification and maintenance. During the past 20 years its modeling capabilities and computational performance have expanded to a degree that it can handle a wide variety of real-life, industrial-grade electromagnetic applications, such as:

• Antenna applications: Optimization and design, Antenna placement, Management of Radio-Frequency Compatibility (RFC) on platforms, Wireless communication systems, Instrument Landing System (ILS) and airport environment, Beamforming etc.

• Electromagnetic Compatibility (EMC): Radiated emissions, Immunity testing, Electromagnetic Interference (EMI) and cross-talk etc.

• Radar applications: Radar Cross Section of targets in aerospace, marine and automotive, Design and optimization of Radar Systems, RF sensors (e.g. in autonomous driving, remote sensing, non-destructive testing, etc.)

• Lightning protection of buildings, aircrafts etc.

3. Who should use ASERIS-BE™?

ASERIS-BE™ is a valuable tool for all engineers and analysts who work on the electromagnetic aspects of new product design, development, and optimization. This includes (but is not limited to) CAE engineers in Aerospace, Automotive, Electronics, Wireless communications, Non-destructive testing, etc. By using ASERIS-BE™ for exact electromagnetic simulations of sub-systems, fully integrated systems and system-environment interactions, the design and development process can be significantly accelerated, and the measurement/re-design iterations can be minimized. Furthermore, the precision of design variation predictions that ASERIS-BE™ offers allows for a fast and reliable optimization cycle.

4. Do I need a specific background to work with ASERIS-BE™?

The user should be familiar with the basic theory and terminology of engineering electromagnetics. However, there is no need for familiarity with the underlying theory of boundary element methods or ASERIS™ keywords, since there is a dedicated ANSA Plugin that provides a fully integrated interface to ASERIS™ for the average ANSA user. The electromagnetic model setup and the generation of the dedicated solver-driving files can be completely performed within ANSA, without any need for in-depth acquaintance with the keywords and file structure that is used by ASERIS™.

5. What kind of electromagnetic analyses are covered by ASERIS-BE™?

ASERIS-BE™ can perform exact ("full-wave") electromagnetic simulations in the frequency domain on objects comprised of arbitrary combinations of homogeneous volumes and thin sheets. A wide range of materials for volumes and sheets are supported (e.g. perfect/lossy conductors, dielectrics with/without losses, etc.) Furthermore, a broad palette of model excitations is available, including multiple analytical sources (plane waves,

Hertzian dipoles, imported radiation patterns, etc.), lumped sources, and Huygens sources. This makes ASERIS-BE™ a valuable tool for:

- Radiation analyses
    - Antenna design, optimization, placement.
    - EMC radiated emissions.
    - Wireless transmitters in active RF sensors, Radar, Instrument landing systems etc.
- Scattering analyses
    - Radar Cross Section calculations.
    - Radar sensors for autonomous/assisted driving and navigation.
    - Non-destructive testing systems.
    - Microwave imaging.
- Coupling analyses
    - EMC/EMI: crosstalk and immunity scenarios.
    - Lightning protection.
    - Wireless communication links.
- Generally, any electromagnetic scenario that requires full-wave simulation accuracy, especially in the frequency domain.

6. What kinds of input files are needed for ASERIS-BE™?

ASERIS-BE™ accepts FE models in I-DEAS (*.unv) format. Due to its seamless interface with ANSA, this effectively means that the starting point of an ASERIS™ simulation can be any FE or CAD model that ANSA supports. The dedicated ASERIS™ Plugin of ANSA handles the output of the suitable mesh and solver files for ASERIS-BE™ under the hood.

7. Do I need to install a special material database to work with ASERIS-BE™?

No. The ASERIS™ Plugin in ANSA provides the possibility of creating all types of suitable materials that are supported by ASERIS-BE™.

8. Can I install ASERIS-BE™ independently of BETA software (e.g. ANSA, META)?

Yes, ASERIS-BE™ is a standalone software and can operate independently of BETA products. However, since it lacks a graphical user interface and requires a geometry preprocessor for generating the simulation input data, as well as a post-processing software to view the results, it is strongly recommended to use it in conjunction with ANSA and META. Along with its superb pre-processing and meshing capabilities, ANSA features a dedicated Plugin for setting up ASERIS™ simulations. As far as the simulation results are concerned, META provides its full arsenal of general (and automatable) viewing / post-processing tools alongside specialized tools developed for electromagnetic applications, like the Far field tool.

9. How can I have a license file for ASERIS-BE™ generated?

In order to have a license file generated for a server, the ULMID of this server has to be reported.
Download and run the ULMID retrieval tool to collect the ULMID of the server.

Alternatively:

- Download and install the ULM Server (simple archive extraction).
- Execute the command: "ulmtool -ulmids".

Report back the hostname and the ULMID of the license server to have the license server registered, so the request for a license server can progress.

The ULMID retrieval tool and the ULM License Server reside in the "ASERIS-BE" folder on BETA CAE Systems downloads server. This can be accessed by following the "download" link at the top of the BETA CAE Systems website. Credentials for this access are issued by BETA CAE Systems at the beginning of the process.

10. Do I need a different license manager than BETA LM?

Yes. The IMACS ULM should be downloaded and installed, along with the ASERIS-BE^{TM} license file, to enable code execution.

11. How is the ASERIS-BE^{TM} license file structured?

This license file provides one token for each software license to be enabled.

12. Are there any limitations to the software capabilities?

At this moment, the software is limited to 1 MPI, 16 Threads, and 500 rhs.**

13. Where can I find the ASERIS-BE^{TM} documentation?

A continuously updated and enhanced technical documentation is available online, at the following the link:

 https://imacs.polytechnique.fr/ASERIS-BE

14. May I have an evaluation installation of ASERIS-BE™?

You can request and receive a short-term trial license of ASERIS-BE™ from BETA CAE Systems and its distribution channel.

15. How can I receive technical support?

All licensed users are supported by the BETA CAE Systems Customer Service and the service teams of our business agents. IMACS supports these teams with high-level technical support for code enhancements and prompt updates. You can sign-up to the the BETA CAE Systems Service Desk through our Support web-page.

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