HIGH*LY PRODUCTIVE* PERFORMANCE COMPUTING

$$PS)2 + (0.5r * v2)2 = (PS)1 + (0.5 * r * v2)1$$
$$= constant$$
$$c P.E$$

= HPC++
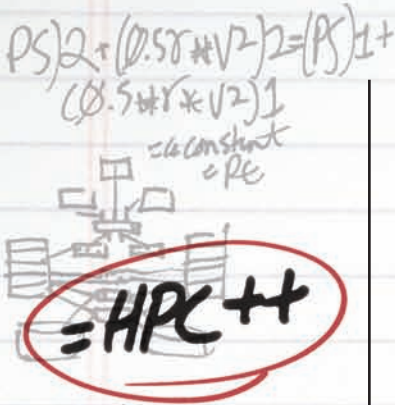
efield

OVERVIEW

Efield AB, based in Kista, Sweden, is the provider of Efield® software, widely used by designers of complex systems, for computational electromagnetic simulation.

Virtual prototyping is widely used by designers, in the early stages of product development, to optimize product design. Simulations during the design phase, provide insight without the need for performing expensive measurements on real objects. This approach results in faster time-to-market for advanced products.
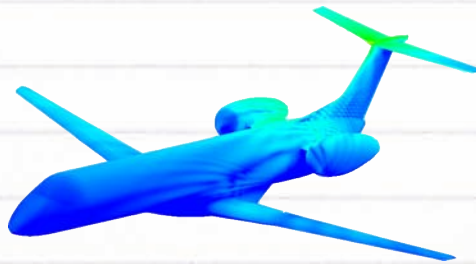
Simulating complex electromagnetic phenomena involves demanding computational challenges that require parallel computing resources, and software that is parallelized. All Efield® solvers are written to run efficiently on parallel computers.

Windows HPC Server 2008 is the Windows HPC platform for running Efield® simulation software.

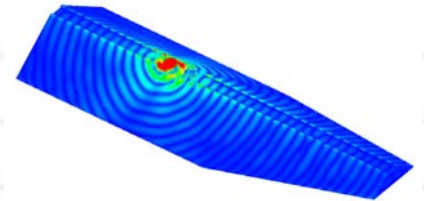## WINDOWS® HPC SERVER 2008 ENERGIZES ELECTROMAGNETIC SIMULATION.

A complete parallel solution for electromagnetic virtual prototyping that won't jolt your IT budget. Windows HPC Server 2008 platform runs Efield® simulation software.

Electromagnetic (EM) phenomena is involved in the engineering of a large number of advanced products, ranging from antenna systems design, to microwave components- such as transmission lines or power dividers, to electronic equipment used in different systems. Often, the objects under study are large compared to the EM wavelengths, which can lead to demanding computational challenges. For example, consider the impact of a lightning strike on the sensitive electronic systems in aircraft. In this scenario, the simulation problem consists of modeling and understanding the penetration of EM-fields (each having different characteristics) into the interior of an aircraft, and the corresponding induced wire currents due to the injected lightning current, as well as modeling joints and rivet seams to minimize the probability for sparks to appear. This complex a simulation can involve models as large as one billion cells.

Model of surface currents on a satellite where the GPS antennas have been designed by Saab Space and simulated using Efield®. Image courtesy of Efield.

Efield®

Efield® offers an integrated environment for computational electromagnetics containing a complete set of solution techniques, including novel hybrid methods between finite difference, finite element, method of moments, fast multipole method, and high frequency methods. Using the Efield® graphical user interface (GUI) users can import native geometry data from all common CAD systems or standard file formats, or can build models from scratch.

Model of surface currents on an Embraer civilian air-craft induced by an antenna placed at the top of the tail. Image courtesy of Efield.
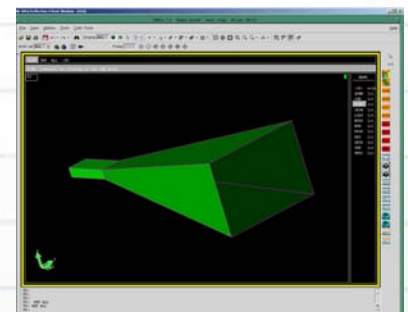
Efield® is the preferred software for modeling and understanding EM phenomena. Windows HPC Server 2008 provides Windows customers with a scalable, affordable, manageable HPC solution for running computationally intensive simulations.

The Efield® GUI.

For HPC environments, Efield® offers both time domain (TD) and frequency domain (FD) parallelized solvers. The Efield® FDTD solver is a multi-block solver, where the individual blocks can be distributed among the processors with a minimum amount of inter-process communication.

Microsoft®

Windows® HPC Server 2008

WINDOWS HPC SERVER 2008

Windows HPC Server 2008 combines the power of a Windows 64-bit Server platform with rich, out-of-the-box functionality to improve the productivity, and reduce the complexity, of your HPC environment. Windows HPC Server 2008, provides a comprehensive set of deployment, administration, and monitoring tools that are easy to deploy, manage, and integrate with your existing infrastructure.

Windows HPC Server 2008 enables broader adoption of HPC by providing a rich and integrated end-user experience scaling from the desktop application to the clusters. Efield® software works seamlessly with Windows HPC Server 2008 so that users can submit and monitor jobs from within familiar applications without having to learn new or complex user interfaces.

SOLUTION BENEFITS

For Windows-based customers seeking to solve complex electromagnetic design problems faster than before, the combined Efield®, Windows HPC Server 2008 solution offers users the ability to:

- Solve more complex problems accurately while shortening turnaround times.

- Shorten design time cycles while increasing product innovation.

- Increase user access to HPC while decreasing demands for IT support.

HOW IT WORKS

1. The end user submits an Efield® MPI job from the client work station to the head node. This can be done two ways: either through a command file, or via the HPC Pack client utilities using job templates.

2. The head node receives the MPI job from the client work stations, requests resources as specified by the allocation parameters of the command file or template, and submits the job the queue.

3. Once the requested resources are available, the MPI job is submitted to the node manager of one of the allocated compute nodes.

4. The node manager launches the MPI job across all requested compute nodes, and makes sure that the input files of the Efield® executable are a copied to all participating compute nodes.

5. The compute node will execute the computational task(s).

6. Output files are returned to a file share that can be accessed by the client workstation for subsequent postprocessing.

7. The job manager reports the job as finished and the allocated resources are released.

FURTHER INFORMATION

For more information about Windows HPC Server 2008 and HPC please visit http://www.microsoft.com/hpc

For more information about Efield solutions and Efield® software please visit http://www.efieldsolutions.com

Microsoft®