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Simulation Software Solvers Tackle Multiple Problems

The FEKO simulation software tool encompasses several different electromagnetic solution methods, making it suitable for a large number of applications.

COMPUTER-AIDED ENGINEERING (CAE) software plays a critical role in today's design process. Electromagnetic (EM) analysis is extremely valuable—so much so that it can even replace expensive measurements on full-scale structures. Designs can therefore be analyzed efficiently, lowering cost and significantly decreasing development cycles.

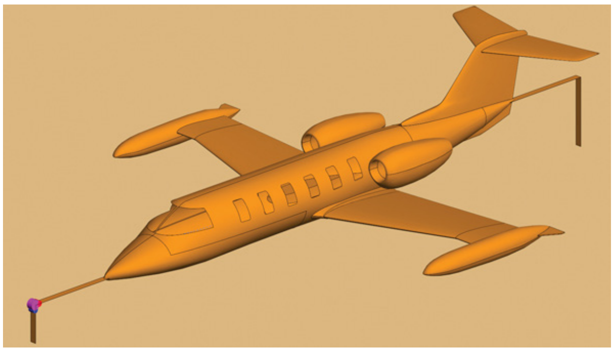
FEKO, which is integrated into the HyperWorks simulation software platform from Altair Engineering (www.altair.com), is a software tool used to perform EM field analysis of three-dimensional (3D) structures. It includes several solvers in all versions, thus enabling users to tackle a wide range of EM problems.

FEKO is well-suited for the analysis of antennas, as well as RF/microwave components like filters, couplers, isolators, and circulators. Antenna-placement analysis is another capability, as the software can simulate an antenna's interaction with electrically large environments *(see figure)*. FEKO is also used extensively to perform electromagnetic-compatibility (EMC) analysis.

EM simulation requirements vary in terms of geometrical complexity and electrical size. No single numerical method can efficiently handle the entire range of potential EM problems on its own. Thus, all versions of FEKO include multiple solvers, which are also hybridized. The strengths of the most suitable techniques are combined, resulting in hybrid solutions.

To solve geometrically complex problems, the software offers method of moments (MoM), finite-element method (FEM), and finite-difference-time-domain (FDTD) solvers. The FDTD solver, which was incorporated into the suite 7.0 release, is a good fit for modeling inhomogeneous materials. The multilevel fast multipole method (MLFMM), physical optics (PO), ray-launching geometrical optics (RL-GO), and uniform theory-of-diffraction (UTD) solvers are ideal for electrically large problems.

FEKO has many features that enhance its performance capability. The adaptive-frequency-sampling (AFS) technique, for example, automatically selects frequency sample points, enabling fast and accurate simulations. Responses are sampled more densely when needed—at resonances, for instance.



FEKO can analyze the placement of antennas on a wide range of platforms, such as aircraft and ships.

Users can achieve optimal designs by means of the various optimization methods available in FEKO. A number of optimization goals can be specified. In addition, several goals can be combined to accommodate multiple optimization requirements.

A standard FEKO workflow begins with the CADFEKO graphical-user-interface (GUI). Users can create their own computer-aided-design (CAD) geometry models. CAD models can also be imported from various formats, such as Parasolid, AutoCAD DXF, Gerber, and ODB++. Another feature is the advanced CAD healing functionality, which enables inconsistencies, gashes, slivers, and spikes to be fixed.

The media library includes pre- and user-defined materials. CADFEKO also has a scripting interface based on the Lua programming language to create advanced user-specified models.

The POSTFEKO GUI is where a standard FEKO workflow ends. This GUI allows users to visualize and compare simulation results. Users can also generate reports by exporting an active POSTFEKO session to a PowerPoint, Word, or PDF file. Various image, animation, and data export options are available.

Finally, POSTFEKO utilizes the Lua programming language to allow scripting for advanced user-specified post-processing. For example, users can create non-standard output types and plot them in the POSTFEKO interface. mw