Altair® Flux™

Low Frequency Electromagnetic Analysis for Electrical Engineering
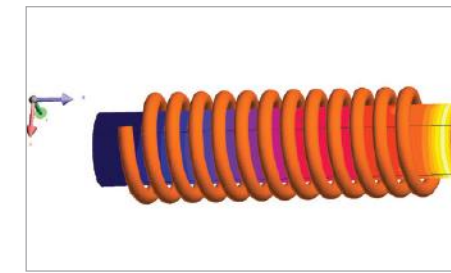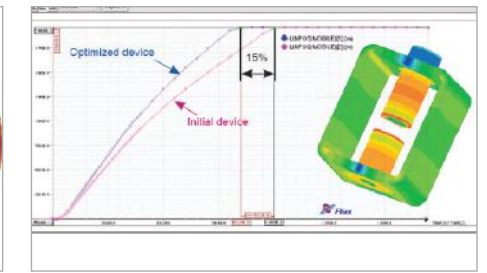

Altair® Flux density in an induction machine with Skew rotor

Altair® Flux induction heating application

15% gain on response time - Actuator response time optimization

Capitalizing on thirty-five years of innovation in the global context of design optimization and time-to-market reduction, Altair® Flux finite element software provides solutions to low-frequency electromagnetic and thermal simulation problems. Altair® Flux includes an open and user-friendly interface that is easily coupled with otherbAltair® software to address multiphysics problems for a variety of systems in 2D, 3D and Skew modeling situations.

Product Highlights:

Powered by best-in-class numerical techniques, Altair® Flux provides fast and accurate results. Featuring extended multi-parametric analysis capabilities, including electrical circuit and kinematic couplings, Altair® Flux helps you analyze, design, and optimize a wide range of systems.

Numerous Applications

- Rotating machines
- Linear actuators, solenoids
- Transformers & inductances
- Induction heating processes
- Sensors
- Cables, electric connections
- Electromagnetic compatibility

Learn more:
Altair.com/flux

Benefits

Accuracy
Altair® Flux applies advanced numerical methods and well-adapted modeling techniques to produce the most accurate and reliable results in the shortest amount of time.

Altair® Flux developers are constantly improving the embedded solvers to increase simulation speed and enable the evaluation of thousands of design configurations.

Interoperability
Altair® Flux can be coupled with other 3D analysis software to create the most realistic multiphysics representations of phenomena. Considering a device as a component of a larger system or designing its control strategy is also possible by linking Altair® Flux to system level simulation tools. Different levels of interaction are possible, ranging from reduced model extraction to full co-simulation.

Flexibility
- The software behavior is fully customizable to user preferences.
- Embedded scripting tools and macro-authoring enable the capture and automation of simulation processes. Difficult workflows can be fully saved and repeated.
- Altair® Flux can be coupled with any software, enabling high productivity and access to non-specialists.

Parametric Simulation
Parametric Simulation

Capabilities

Wide Field of Use
- Magnetic, electric, and thermal fields
- Magnetic/dieletric/thermal coupling
- Mechanical coupling
- Multiphysics coupling

Fundamental to working with Altair® Flux is defining geometric dimensions or physical characteristics with parameters. Linking several parameters together through equations is very easy. The influence of any parameter in a simulation can be intuitively explored and visualized through multidimensional curves and animations of color shades or arrows.

- Static, harmonic, and transient analysis
- Parameterized analysis
- External circuit connection

Powerful Geometric Description
- Easy sketcher of 2D geometry, including parametric capabilities
- Embedded 3D modeler with fully parametrized modeling constructs
- Advanced CAD import & export functions
- Defeaturing and simplification capabilities
- Dedicated environment for electric rotating machines designed in 2D and 3D

Easy and Flexible Mesh Generator
The Altair® Flux mesh generator provides different mesh types and meshing technologies that can be mixed in both 2D and 3D situations:
- Smart automatic mesh generation based on geometry & physics
- Fine manual control of mesh size and distribution
- Mapped mesh and linked mesh
- Auto-adaptive mesh refinement during solving in 2D & 3D

Altair® Flux is also able to import meshes directly from Altair® HyperMesh™ and Altair® SimLab™ to deal with complex 3D CAD geometries.

Advanced Modeling Techniques
for Accurate and Fast Results
- Infinite box for open boundary problems
- Non-meshed coils
- Thin regions represented by surface models
- Fast evaluation of geometry skewing effect
- Non-linear anisotropic material behavior
- Hysteresis modeling
- Skin and proximity losses in windings
- Partial Element Equivalent Circuit method for power conductors

Robust Solving
- Fully parametric solver enables geometrical or physical parameter sweeps
- Several iterative and direct linear solvers with multiprocessing

- Non-linear solvers
- Distributed parametric studies across several cores or machines
- Auto-adaptive mesh and time-step

Post-Processing
Altair® Flux gives access to various quantities including:
- Electric and magnetic fields temperature
- Magnetic flux, inductances, energy
- Iron losses and Joule losses
- Position, velocity, force, torque, speed
- Skin effect visualization
- Equivalent RLC circuit extraction and export
- User-defined quantities
- Maps, isovalues, and vector plots
- Animations
- 2D and 3D curves
- Spectral analysis
- Cutting planes
- Look up tables for system simulation
- Export capabilities (Excel, text, and more)

Multiphysics
Altair® Flux provides fully cabled solutions to set up co-simulations and exports with specialized tools focusing primarily on magnetothermal and magneto-vibro-acoustics analysis.

Magneto Thermal Analysis
Coupling Altair® Flux with CFD simulation tools like Altair® AcuSolve™, CD-Adapco STAR-CCM+ or ANSYS Fluent makes results even more powerful by taking into account fluid dynamics, and enhancing the accuracy of the thermal analysis. Efficient and accurate design is possible with Altair® Flux thanks to all the available thermal couplings!

Coupling with Mechanical Stress Evaluation and Vibration Analysis
Electromagnetic forces are the source of mechanical stress or noise in electromagnetic structures.
Altair® Flux is able to accurately compute these forces and export them to stress or vibration analysis tools such as Altair® OptiStruct™,LMS Virtual.Lab, MSC Nastran or ANSYS Mechanical.

Advanced System Integration
Considering the component in its mechatronic environment is key to optimizing its performance and look into efficient control strategies. Through equivalent circuit extraction, table export or co-simulation, it is possible to couple Altair® Flux with Altair®'s system simulator Altair® Activate™, using several levels of fidelity, depending on the design needs. The couplings with other tools like MatLab Simulink and LMS Imagine.Lab Amesim are also available.

Simulation Process Automation
- Define macros and interfaces
- Simplify processes from geometry generation to post-processing results via command language derived from Java and Python object-oriented languages
- Include Altair® Flux in a wider calculation process in Altair® Compose
- Use the API to access Altair® Flux from any software

Optimization
Boost your Altair® Flux capabilities with Altair® HyperStudy™, a powerful and reliable optimizer that does not require you to be an expert in optimization methods. Well-adapted to drive FEM models, Altair® HyperStudy™ goes beyond simple parametric studies, which allows for significant gains in your designs.

High Performance Computing (HPC) Solutions
Affordability of computers with multiple processors or clusters bring new possibilities to simulate many design configurations concurrently. The distribution of parametric calculations is directly available in Altair® Flux for all applications.

Altair® Flux is connected to Altair® PBS Works™, Altair®'s leading solution for computing workload management, which will let you take advantage of the full power of remote Altair® HPC clusters.