

Capitalizing on 35 years of innovation in the global context of design optimization and reducing time-to-market, Flux FE software simulates low-frequency electromagnetic and thermal conditions. With open and user-friendly interface, Flux easily couples with other Altair software for multiphysics solutions.

Product Highlights

- Magnetic, electric and thermal analysis of 2D/skew/3D projects
- Static, harmonic and transient
- FluxMotor import and motor-dedicated environment
- Advanced losses modeling
- Proven speed and accuracy
- Excellent multiphysics and optimization interoperability
- Comprehensive customizable environment: automation; design acceleration

With best-in-class numerical techniques, extended multi-parametric analysis (electrical circuit and kinematic couplings), Flux's fast and accurate results help designers analyze, design, and optimize:

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

Benefits

Accuracy

By constantly improving advanced numerical methods and well-adapted modeling techniques, Flux delivers the most accurate and reliable results in the shortest amount of time.

Flexibility

- Fully customizable
- Embedded scripting tools and macro-authoring to capture and automate simulation processes
- Multiparametric and optimization

to intuitively explore thousands of design configurations to quickly find the best performing options

- Couple with any software for high productivity and access to non-specialists

Interoperability

When coupled with other 3D analysis software, Flux creates the most realistic multiphysics representations of phenomena. Given a device is a component of a larger system, design of its control strategy by linking Flux to system level simulation tools offers different interaction levels: from reduced model extraction to full co-simulation.

Capabilities

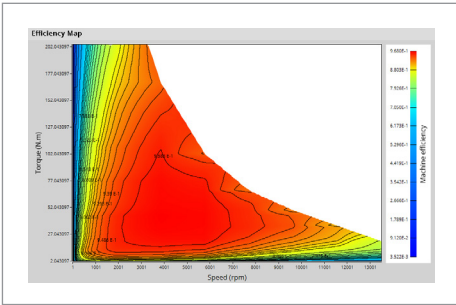
Wide Field of Use

- Magnetic, electric, and thermal fields
- Magnetic/dielectric/thermal coupling
- Static, harmonic, and transient analysis
- Parameterized analysis
- Multiphysics coupling
- External circuit connection

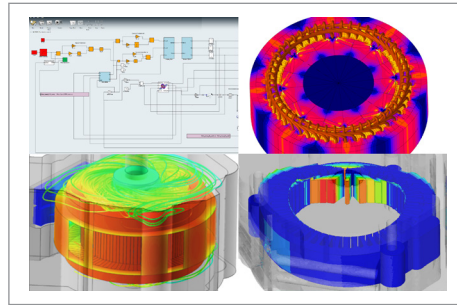
Powerful Geometric Description

- Embedded easy sketcher and modeler with

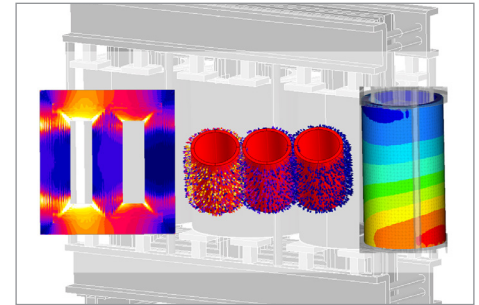
Learn more:
altair.com/flux



Flux dedicated processing for motor design



Multiphysics analysis of electric motors



A complete solution to design power transformers

- fully parametrized modeling constructs
- Advanced CAD import/export and defeaturing functions
- Dedicated environment for 2D and 3D design of electric rotating machines
- Direct import of FluxMotor parameterized models

Flexible Mesh Generator

- Mixed, different meshing technologies by Flux mesh generator for both, 2D and 3D:
- Easy smart automatic mesh generation based on geometry and physics
 - Fine manual control of mesh size and distribution
 - Mapped mesh and linked mesh
 - Easy skin depth meshing
 - Auto-adaptive mesh refinement during solving
 - Direct mesh import from Altair HyperMesh™ and Altair SimLab™ for complex 3D CAD geometries.

Advanced Modeling Techniques for Accurate, Fast Results

- Infinite box for open boundary problems
- Non-meshed coils option
- Thin regions surface representation
- Fast evaluation of geometry skewing effect
- Non-linear anisotropic material behavior
- Demagnetization of permanent magnets
- Advanced modeling of iron losses
- Skin and proximity losses in windings
- Fast flux leakages modeling using new integral methods
- Partial Element Equivalent Circuit method for power conductors

Robust Solving

- Fully parametric solver for geometrical or physical parameter sweeps
- Several iterative and direct linear solvers with multiprocessing
- Non-linear solvers
- Distributed parametric studies across several cores or machines

Post-Processing

- 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
- User-defined quantities
- Maps, isovalues, and vector plots
- Animations
- 2D and 3D curves
- Spectral analysis
- Cutting planes
- Look up tables and FMU export for system simulation

Multiphysics

Flux has fully cabled solutions for co-simulations and exports with specialized tools focusing on magnetothermal and magneto-vibro-acoustics analysis.

Magneto Thermal Analysis

Coupling Flux with CFD simulation tools like Altair AcuSolve™, STAR-CCM+ or ANSYS Fluent to take into account fluid dynamics, and enhance accuracy of thermal analysis. Attain efficient, accurate design with Flux due to all the available thermal couplings!

Coupling with Mechanical Stress Evaluation and Vibration Analysis

Electromagnetic forces cause mechanical stress or noise in electromagnetic structures.

Flux accurately computes these forces and export them to stress or vibration analysis tools: Altair OptiStruct™, LMS Virtual.Lab, MSC Nastran or ANSYS Mechanical.

Process Automation

Considering the component in its mechatronic environment is key to optimizing its performance and finding efficient control strategies. Through equivalent circuit

extraction, FMU export or co-simulation, it is possible to couple Flux with Altair's system simulator Altair Activate®, using different levels of fidelity, depending on the design needs. Coupling with other tools like Matlab Simulink and Simcenter Amesim is also possible.

- Define macros and interfaces
- Simplify processes with Java and Python derived object-oriented languages
- Use the API to access Flux from any software
- Connect to Altair SimLab™ process-oriented environment to automate workflows for coupled analysis

Optimization

Mixing physics and constraints complicates designers' tasks. While traditional methods tend to address different physics separately, leading to many costly iterations, Flux's strong connection to Altair HyperStudy™ connects various physics together in a single optimization loop.

- Screening or sensitivity analysis to gain insight into most relevant parameters
- Design of experiment coupled with optimization using response surfaces
- Stochastic approach to assess reliability and robustness

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 Flux applications.

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