ANSYS Electromagnetic Field Simulation

ANSYS is the leading developer of electromagnetic field simulation software used by engineers to design electronic and electromechanical products across a broad range of industries. The electromagnetic product suite focuses on improving physical design by leveraging advanced electromagnetic field simulators dynamically linked to powerful circuit and system simulation. This powerful methodology allows users to design and optimize smarter, more automated, efficient and mobile electronic and electromechanical products without costly physical prototypes. Application areas include:

Electromechanical: electric motors and generators, transformers, bus bars, relays, solenoids, power electronics, MEMS and magnet design

High-speed electronic components: on-chip embedded passives, IC packages and PCB interconnects

High-frequency devices: antennas, RF/microwave components, biomedical devices, and EMI/EMC

ANSYS electromagnetic solutions allow the user to gain an understanding of:
- Device performance characteristics under applied loads/excitations and boundary conditions
- Visualization of the electromagnetic field in and around a device
- Joule heating effects and resultant temperatures
- Force distribution and resulting deformation
- Key design parameters: torque, force, resistance, inductance, capacitance, impedance, S-parameters and radiated fields and emissions

Electromagnetic Field Simulation Products
Maxwell® is a software package for low-frequency electromagnetic field simulation. Maxwell can be used to design 3-D/2-D structures, such as motors, actuators, transformers and other electromagnetic and electromechanical devices. Maxwell technology is based on the finite element analysis method and uses the automatic adaptive meshing techniques. This robust meshing algorithm automatically creates and refines the finite element mesh as the solution converges, streamlining the solution process and making the software very easy to use.

Maxwell software can solve static, frequency domain and time-varying electromagnetic and electric fields. In addition, the software can be dynamically linked with Simplorer® software to create a powerful, system-level, electromagnetic-based design flow. This flow enables users to combine complex circuits with accurate component models generated from Maxwell to design and analyze complete systems.

Maxwell Features
Low-frequency electromagnetic field simulation and analysis using FEM for 3-D/2-D structures
- Transient-nonlinear analysis with:
  - Motion-rotation, translational, non-cylindrical rotation
  - External circuit coupling
  - Permanent magnet demagnetization analysis
  - Core loss computation
  - Lamination modeling for 3-D
- AC electromagnetic analysis of devices influenced by skin/proximity effects, eddy/displacement currents
- Magnetostatic nonlinear analysis with automated equivalent circuit model generation
- Electric field: transient, electrostatic/current flow analysis with automated equivalent circuit model generation
- Automatic, adaptive mesh technology
- Fault-tolerant meshing algorithms
- Mesh-generation feedback
  - GUI performs validation and integrity checks
  - Software identifies artifacts within the imported geometry
- Mesh-based model resolution
- Fault-tolerant meshing algorithms
- Display of data/visualization of results
  - Field visualization and animations (shaded, contour and vector plots)
  - Mesh visualization (full, partial)
  - Current, induced voltage, flux linkage
  - Power loss, stored energy
  - Core loss, eddy, excess, hysteresis loss (including the minor loop effects)
  - Impedance, inductance, capacitance
  - Force, torque
  - Custom reports of user-defined solution data