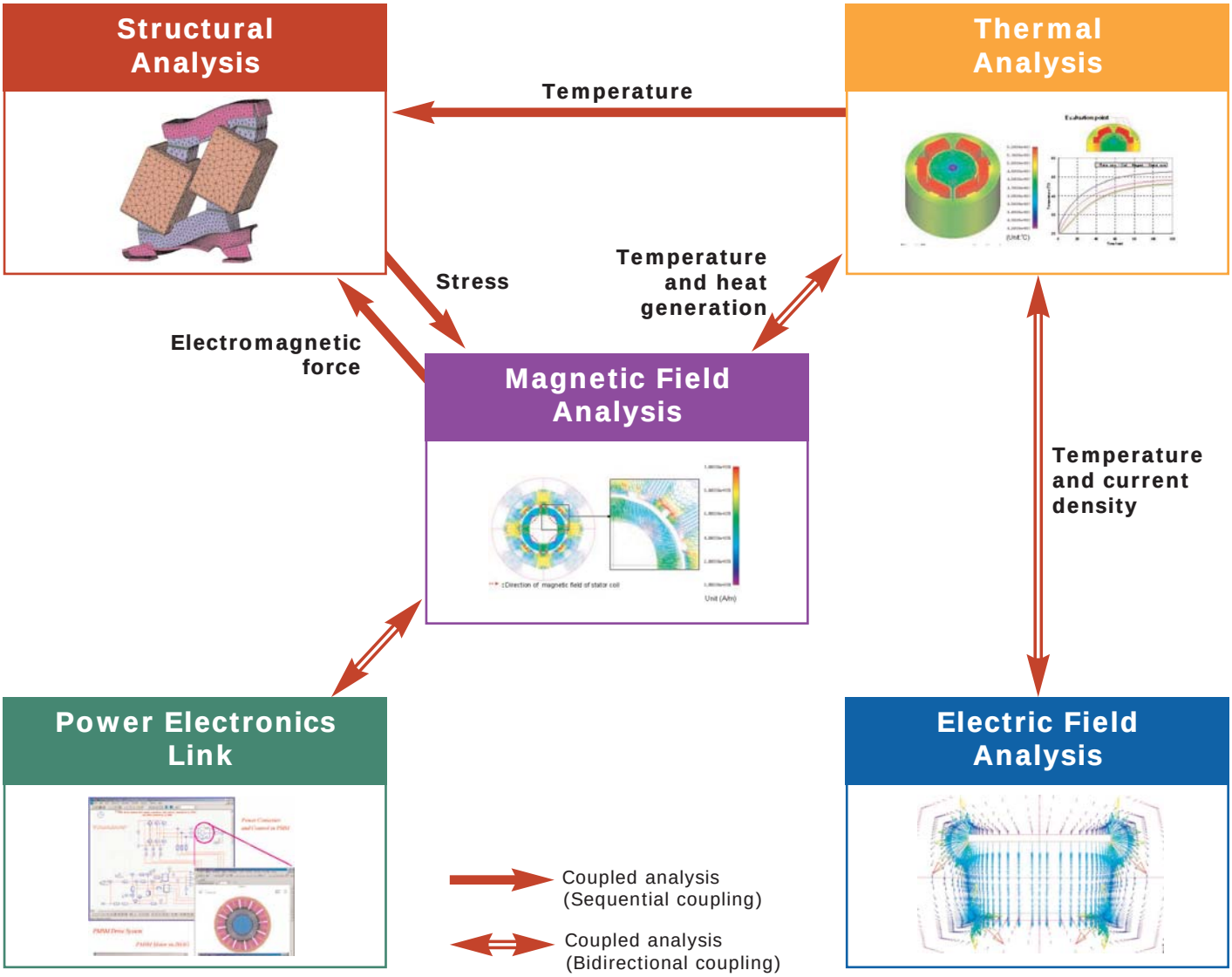
*Your European Partner in Power Simulation*

# JMAG Software
# Coupled Analyses




## Coupled Analyses

JMAG gives to people involved in optimization of mechatronic equipments not only a magnetic solution but also a solution to realize coupled analyses. Novice or experts engineers can handle Thermal or Structural / Magnetic coupled analyses easily. They can also link the analysis with a power electronics simulator allowing then a significant saving time to evaluate the real equipment behaviour.

## Key Features

- Easy to parameter
- For novices and experts use
- Direct Magnetic-Thermal coupling
- Direct Magnetic-Structural coupling
- Direct Electric-Thermal coupling
- Co-simulation with circuit softwares (PSIM, Matlab/Simulink )
- Real Time Modeling Tool

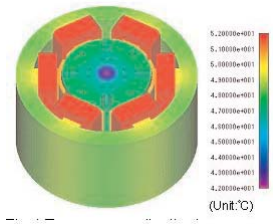

POWERSYS - Tel : +33 (0)4 42 63 60 88 - Fax : +33 (0)4 42 63 61 29 - Email : jmag@powersys.fr
www.powersys.fr

# JMAG Software
# Coupled Analyses

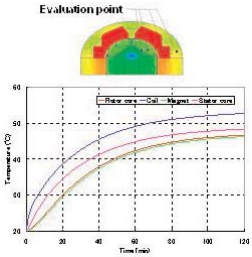
## Magnetic-Thermal Coupled Analysis

JMAG enables the coupling of thermal analysis, both steady state and transient, with the magnetic/electric field solvers. Direct coupling allows the temperature dependency of magnetic and electric properties to be included in an analysis.

**Outputs:**
- Temperature Distribution
- Heat Flux Vector
- Heat Generation Density
- Total Amount of Heat Generation
- Average Temperature




*Temperature distribution of an IPM Motor*

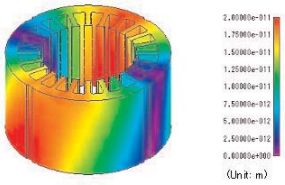



*Temperature variation of an IPM Motor*

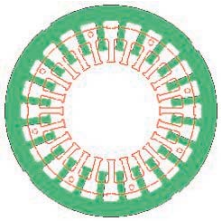
## Magnetic-Structural Coupled Analysis

JMAG's structural analysis module can calculate stress, vibration, centrifugal force, contact and sound pressure. The forces calculated from the magnetic flied analysis can be applied directly to the structural model. The magnetic field analysis can also include the stress dependent properties of the materials, with stress derived from the stress analysis. In addition, eigenvalue analysis is available as a separated feature.

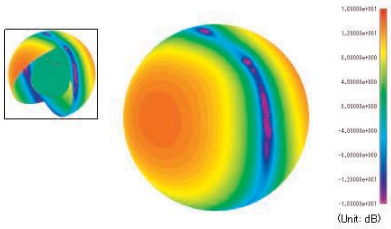
**Outputs:**
- Stress, Displacement
- Velocity
- Acceleration
- Sound level
- Sound Pressure
- Eigen modes
- Centrifugal Force
- Vibrations




*Displacement*



*First eigen mode of an SPM Motor stator core*

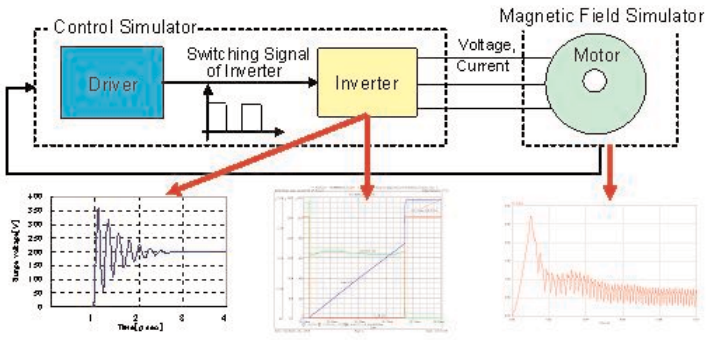



*Sound pressure distribution of an SPM Motor*

## Power Electronics

JMAG allows co-simulation with circuit simulation softwares such as PSIM, Matlab/Simulink, PSpice.
JMAG provides as well the RT module to improve the co-simulation by creating behaviour models that is suitable for use in a control/circuit simulator or real-time simulator such as those used in developing a motor drive system.

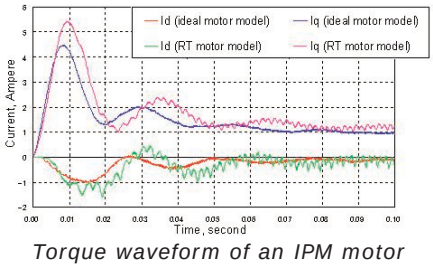
**Outputs:**
- Behavior model
- inductance map



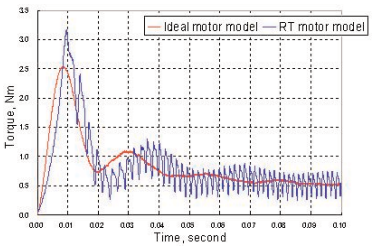

Waveform of Surge Voltage

IGBT Loss

Torque Characteristics




*Torque waveform of an IPM motor*




*Id, Iq current waveform of an IPM motor*

POWERSYS - Tel : +33 (0)4 42 63 60 88 - Fax : +33 (0)4 42 63 61 29 - Email : jmag@powersys.fr
www.powersys.fr