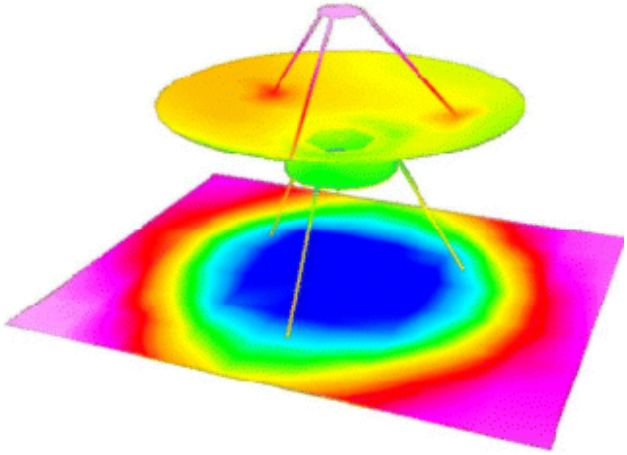
Overview of TMG Thermal Analysis

TMG software is a comprehensive heat transfer simulation package which provides fast and accurate solutions to complex thermal problems.



Using advanced finite difference control volume technology, TMG makes it easy to model nonlinear and transient heat transfer processes including conduction, radiation, free and forced convection, fluid flow, and phase change

Elements may be any combination of solids, shells, and beams. Arbitrary free meshes and element shapes are supported, as well as axisymmetric elements. Material properties may be isotropic or orthotropic, and may vary with temperature.

Conduction is modeled by linear conductance terms, computed using a control volume approach which uses an element temperature function constrained at calculation points on the boundaries and at the geometric centroid. An element center method, based on Fourier's law with linear reduction is also provided.

Boundary conditions can be element based or geometry based:

- Fixed or initial temperatures
- Heat loads and fluxes (surface or body)
- Radiative and convective boundary conditions
- Constant or time-varying
- Time-averaged heat loads
- Thermostats with hysteresis

Thermal Couplings provides a powerful and efficient capability for building assemblies by modeling heat flow between unconnected parts and components. Conductances are created between elements coated on the corresponding surfaces or edges. The couplings are established based on element proximity and are distributed to account for overlap and mismatch between disjoint or dissimilar meshes. Coupling types include conductive, radiative, convective, and interface.

Additional thermal modeling and simulation capabilities include:

- Phase change
- Radial heat flow formulation
- Table dependent parameters
- Non-geometric modeling
- One-way (advective) conductances

Model simplification tools are available for simplifying or conditioning a finite difference thermal model prior to solution. They include element deactivation, conductance thinning, element merging, and model substructuring.

Temperature mapping can be used to map thermal model results onto another finite element model with a different mesh. This enables coupled thermal and structural analysis to be performed concurrently on the same part without using the same element mesh.

Interfaces are provided to other thermal analysis programs. TMG can translate its finite difference thermal model to create SINDA, ESATAN, and TRASYS input files. Results from SINDA and ESATAN can be converted back to TMG for post-processing.
