Setting Additional Solver Options

Pick *Solution Methods...* from *Solver Control* to select and specify options related to the solution of the conductance matrix. For most models, the default settings will provide good results. However, for difficult, highly non-linear thermal models, these options can help reduce solution time.

The *Iteration Limit* is the maximum number of iterations performed to solve the matrix per time step. If this limit is exceeded, the solver will pass to the next time step.

The *Convergence Criterion* lets TMG determine when the matrix is solved. The *Preconditionning Matrix Fill Value* controls the size of the preconditionning matrix.

If TMG cannot meet the convergence criterion specified after the maximum number of iterations it will issue a warning message, and it will try to solve the matrix again with a greater *Fill* value. When convergence is difficult, this may lead to a large system to solve slowing the overall solution. In this case, check the warning message: TMG tells you how far the solution is from the *Convergence Criterion*. You can then increase the *Convergence Criterion* to obtain a faster solution.

Conduction Options

There are two alternatives available for modeling conduction heat transfer.

The Element CG Method is based on a finite volume formulation. Calculation points are established at the element centroid, and at each boundary (edge or face). Conductances are established from each boundary calculation point to both the centroid and the remaining calculation points. Radiative and convective heat flows to and from the element are via the centroidal calculation point.

With the Element Center Method, a single calculation point is established at the intersection of an element edge (or face) normals. With this simpler method, the Fourier's law used to computed conductive conductances between adjacent elements is simply: $G=KA/L$. Skewed or irregular shaped elements are treated by subdivision. If the Solid Element Subdivision option is not selected, TMG will compute conductances from the element center to each face of the solid.

The Element CG method is the default method and is recommended over the Element Center Method.

Convergence Trace

This provides a comprehensive diagnostic output of the model's convergence parameters at every iteration. It can be used to determine if a solution is oscillating, diverging, or converging. The data is output to the TMG message file tmgmsg.dat.