# Specifying Thermal Calculation

When solving models using *Orbit/Attitude Modeling* perform a preliminary steady-state analysis first. This enables you to quickly check your model for possible errors and provides an initial temperature distribution file for the transient analysis. The extra calculation time is minimal since much of the steady-state calculation can be reused for the transient analysis.

## Steady-State Analysis

### Time Averaged Transient Heat Loads

When solving a transient model in steady-state mode, you have to specify how the transient loads should be treated. Use the *Time Averaged* option.

For orbital models with this option, TMG calculates Earth and solar view factors for each calculation point over one orbit and computes an average planet and solar heat load to apply to the model. All other transient heat loads are also averaged.

From this analysis, you obtain a temperature distribution to use as the initial temperature for the transient analysis.

### Checking View Factors

Since TMG calculates view factors for each calculation point, you can use the steady-state analysis results to check your model. The REPF file lists the view factor sums for each enclosure and you can post process the Earth and solar view factor to verify whether they correspond to the physics of the model.

### Checking Articulation

For models with articulation, TMG must calculate the articulation displacement to calculate the view factors at each calculation point. Even with steady-state results, you can post process the articulation displacement over an orbit. For solar panels, you can post process the solar view factors on the rotating panels. (See *Post Processing Transient Analysis*).

There is a faster alternate method to verify articulation by performing an analysis that calculates displacement only (without view factor calculation). See *Modeling Articulation*.

## Optimizing the Transient Analysis

### Initial Model Temperature

When solving a transient analysis, using an initial temperature distribution improves the accuracy of the results and shortens the analysis time.

To specify an initial temperature distribution, use the TEMPF file obtained from the previous steady-state analysis. Copy this file to a new name or directory and select it as initial temperature file with *Initial Conditions*.

If you have already performed a transient analysis for the same model, you should consider using these results as the initial temperature distribution. The best initial temperature distribution is the one that most closely represents the state of the model at the start of the analysis.

IFor a new model, the steady-state analysis results obtained with the *Time Averaged* option are a much better estimate than specifying a constant temperature for the whole model.

## Restart option

For the transient analysis, TMG can reuse, instead of recalculate, most data obtained from the steady-state analysis including the time consuming view factor caculations. With the *Reuse Previous Model, Update BCs* restart option you can solve a transient analysis while reusing previously calculated data.

If you want to keep the steady-state analysis results, copy them to a new *Run Directory.* Note that *Reuse Previous Model, Update BCs* does not work for models with articulation.

## Periodic Convergence

If you are interested in the stabilized temperature patterns the model reaches after many orbits, use the *Periodic Convergence* option. With this option, TMG compares the temperatures of each element at the beginning and at the end of one period. The program stops if the maximum temperature difference is within the specified limits.

When using this option, the transient parameter *End Time* controls the maximum number of orbits TMG can perform while attempting to meet the criteria.

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