Hints, Tips and Solutions

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Q: Which model for thermal resistivity should I choose? How good is the default model?

A: There are four models with user adjustable parameters which can be used - a constant model (tcon.const), a power law model (tcon.pow), a polynomial law model (tcon.poly) and a reciprocal law model (tcon.recip). The default is the compositionally dependent thermal conductivity model (tcon.comp), which is a version of the power model (tcon.pow) for which there are default parameters for certain popular materials.

Here is a demonstration of how to compare a model with experimental data. The CRC handbook has a table of thermal resistivity vs temperature for silicon. The data can be put into the TonyPlot data format, which will look like this:

This file will give you a graph of k versus T in *TonyPlot*. After you have done that, the next step is to define the model function in *TonyPlot*. We will be using the power law model, so the function definition will look like this:

To plot this in a way that we can see the model clearly, we will be plotting the log of k versus the log of T, so the model will appear as a straight line. The display setup will look like this:

The *TonyPlot* shows the CRC data in red and the model (function 1) in green:
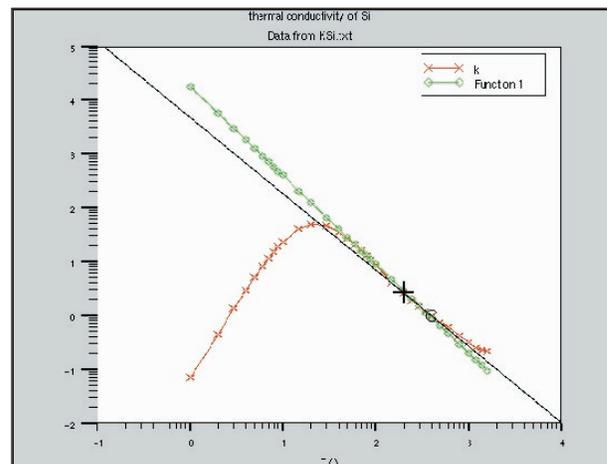
The fit of the power model to the data near room temperature is pretty good. The black line is a fit to the curve in the region from 200K to 400K, which gives a slightly better fit.