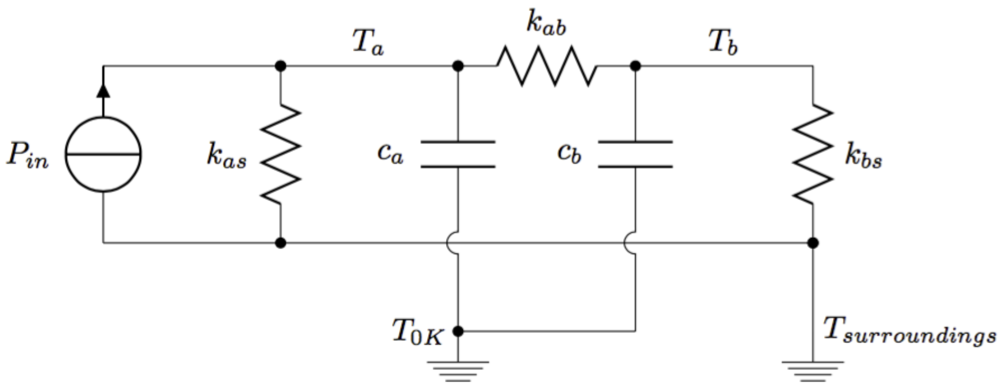

The governing equations are

$$\frac{dT_a}{dt} = \frac{P_{in} - k_{as}(T_a - T_s) - k_{ab}(T_a - T_b)}{c_a}$$

$$\frac{dT_b}{dt} = \frac{k_{ab}(T_a - T_b) - k_{bs}(T_b - T_s)}{c_b}$$

Where the elements are as shown in the circuit diagram, and further, the c's and k's are polynomials according to the relations

$$\begin{aligned}
k_{as} &= k_{as0} + k_{as1} T_a + k_{as2} T_a^2 \\
k_{ab} &= k_{ab0} + k_{ab1} T_a + k_{ab2} T_a^2 \\
k_{bs} &= k_{b0} + k_{b1} T_b + k_{b2} T_b^2 \\
c_a &= c_{a0} + c_{a1} T_a + c_{a2} T_a^2 \\
c_b &= c_{b0} + c_{b1} T_b + c_{b2} T_b^2
\end{aligned}$$

Which gives rise to a total of 15 adjustable parameters in the model, not all of which are necessarily used to fit the data.

The mapping of the data to the model is as follows:

- power_in = heater_power + core_Q_power
- [Ta, Tb] = [core_temp, inner_temp_1]
- Tsurroundings = outer_temp_1

The input-output data structure summarizes the data that are fit to the model in the graph below.