

# AIM Heat Conduction in Hollow Cylinder - Pre-Analysis

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## Problem Specification

1. Pre-Analysis & Start-Up
2. Geometry
3. Mesh
4. Physics Setup
5. Results

## Pre-Analysis & Start-Up

### Pre-Analysis

The governing equation for axisymmetric radial heat flow for a homogeneous cylinder with inner radius  $r_i$  and outer radius  $r_o$  is displayed below. Note that the following equation assumes that the cylinder is long enough for end effects to be ignored.

In the above equation  $k$  is the thermal conductivity,  $A$  is the surface area,  $T$  is the temperature,  $r$  is the radial position and  $Q$  is the heat generation per unit area.

For the given problem there is no heat generation, thus the governing equation can be solved easily. The solution for temperature as a function of radial position is displayed below.

A few words on the formatting on the following instructions:

1. Notes that require you to perform an action are colored in blue
2. General information will be colored in black, but do not require any action
3. Words that are **bolded** are labels for items found in ANSYS AIM
4. Most important notes will be colored in red

### Start-Up

Now that we have the pre-calculations, we are ready begin simulating in ANSYS AIM. [Open ANSYS AIM by going to Start > All Apps > ANSYS 18.1 > ANSYS AIM 18.1](#). Once you are at the starting page of AIM [select the Thermal template](#) in the top right corner as shown below.

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## Thermal: Physics

Additional physics:

- Structural
- Electric conduction
- Fluid flow

Calculation type:

- Steady/static
- Time-dependent

Options:

- Compute fatigue results

Typical settings and results will be defined automatically.

Back Finish

You will be prompted by the **Thermal Template** to either **Define new geometry**, **Import geometry file**, or **Connect to active CAD session**. [Select define new geometry](#) and press **Next**. For this problem we will be using a **Steady/static** calculation type so select it and press **Finish**. No addition physics are necessary. The Model Editor will launch automatically. In order to use the units given to us in the problem [press the Home button in the top left corner](#) and select **Units > U.S. Customary**.

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Finish

[Go to Step 2: Geometry](#)

[Go to all ANSYS AIM Learning Modules](#)