Expt. 4: Conductivity

1. Will the value of the thermal conductivity be different if the powder is packed differently? Explain your answer.
2. Explain what factors can cause deviation from the 1-D radial conduction desired in this setup.
3. For the measurement of the thermal conductivity of the powder, one person (A) chooses to use a hollow cylinder with aspect ratio (ratio of the length of the cylinder to its diameter) of 3 while other person (B) chooses to use a hollow cylinder with aspect ratio (ratio of the length of the cylinder to its diameter) of 25. Whose choice will you agree with and why?

Expt. 5: Parallel + counterflow

1. The hot fluid flows in the inner tube and the cold fluid in the outer annulus. The heat loss by the hot fluid and the heat gained by the cold fluid are independently calculated in the experiment. Will you expect these two values to come out to be the same? If not, explain what discrepancy to expect and why.
2. If the objective of a concentric tube heat exchanger is to cool a hot fluid, would you flow it in the innter tube or in the annulus? Why?
3. Can you think of modifying the setup for studying internal forced convection? If yes, what modifications will you incorporate?