

ME 530 Advanced Conduction and Radiation

Homework Assignment #1

Due: 5:00 pm, Tuesday April 3, 2007

1. Ozisik, *Heat Conduction*, Problem 1-12.
2. Ozisik, *Heat Conduction*, Problem 1-15.
3. Next consider the conditions from Problem 2 with a rod length that is ten times the diameter.
 - a) Calculate the Biot number based on the characteristic radial dimension.
 - b) Calculate the Biot number based on the characteristic axial dimension.
 - c) For the time determined in Problem 2, obtain the fully 2-dimensional temperature distribution in the rod. Plot temperature as a function of the axial coordinate z for several radial coordinates r .
 - d) Compare this solution with a solution for which the radial direction is lumped. Plot the radially lumped temperature distribution as a function of z .
 - e) Finally, compare the previous two solutions with a fully lumped solution and plot all of the results on the same graph.
 - f) Discuss your results.