Computational Fluid Dynamics (AE/ME 339)
MAEEM Dept., UMR, Fall 2001

Home Work Problem 5

A circular steel rod of length L = 30 cm, insulated on the sides, is initially at a temperature of 0° C. Suddenly the two ends are raised to a temperature of 50° C and maintained at that temperature. Use the implicit method discussed in class and calculate the temperature distribution along the length of the rod at following times.

  i)   0.05 s
  ii)   2 s
  iii)   50 s
  iv)   100 s

1. Plot your results in non-dimensional form using $\theta = (T-T_o)/(T_1-T_o)$, where T_o is the initial temperature and T_1 is the temperature at the two ends for $t > 0$.

2. Form a table of values similar to the one given in Example 7.2 (handout)

Use Example 7.2 in Carnahan, Luther and Wilkes for plotting and preparing your write up. You will need to refer to a heat transfer book to obtain the property values of steel. That is also part of the home work.