AME 538, ME 438 Numerical Project Prof. J. M. Powers Due: December 15, 1993

Consider the Blasius problem, flow over a flat plate.

- Plot the dimensionless velocity u_* as a function of the similarity variable η_* .
- For Pr = 1, plot the dimensionless temperature T_* as a function of the similarity variable η_* for Ec = 0, 1/4, 1/2, 3/4, 1. Put all of the temperature profiles on a single plot.
- AME 538 students only–Write an expression for $T_*(\eta_*)$ for general Pr and Ec. Though not required, you may want to include a plot of T_* vs. η_* for Pr = 1/2, Ec = 1.
- If the fluid is air, initially at atmospheric conditions, and the freestream velocity is 80m/s generate dimensional plots of u(x, y) and T(x, y). Assume the thermal conductivity k is such that Pr = 1. Take the ordinate to be y and the abscissa to be either u or T; plot the profiles at various x. Choose the range of y and x such that a meaningful variation is displayed.

Treat this as a formal report. The report should begin with a one page maximum verbal description of the problem and your solution. Include full references if necessary. The text should refer to each figure, which should appear on the following pages. Each figure should be computer generated and labeled. If you feel it necessary, detailed calculations can be reported in appendices. The main text should be done with LaTeX. The appendices can be hand done.