AME 598i
Prof. J. M. Powers
Homework 12
Due: Wednesday 30 April 2003

Consider the one-dimensional analog of the model given by Powers and Gonthier. [1] Use as a starting point Equations (1-8) taking $v = 0$, and take all parametric constants to be those given in the paper.

- Reproduce the scaling arguments to get the proper one-dimensional analog of Equations (12-17).
- Get an analytic solution for $\lambda_1(x)$, $\lambda_2(x)$, $P(x)$, $\rho(x)$, and $u(x)$ in the high Mach number limit. Show plots for each.
- Select a wavespeed which generates an eigenvalue detonation. For this wavespeed, numerically determine and plot $\lambda_1(x)$, $\lambda_2(x)$, $P(x)$, $\rho(x)$, $u(x)$, and $M^2(x)$.
- Similar to Figure 3, plot the $P - \lambda_1$ phase plane.

[1] Powers and Gonthier, 1992, "Reaction zone structure for strong, weak overdriven, and weak underdriven oblique detonations," *Physics of Fluids A*, Vol. 9, pp. 2082-2089.