

AME 538

Homework 18

Due: Friday, 18 October 2002, in class

1. Consider two ideal point vortices, each of strength $\Gamma_o = 2 \text{ m}^2/\text{s}$. At $t = 0$, one vortex is located at $(x, y) = (-1 \text{ m}, 0 \text{ m})$, and the other is at $(x, y) = (1 \text{ m}, 0 \text{ m})$. Take the fluid to be of infinite extent. Write a computer code of some sort (mathematica, maple, fortran, C,..) to solve for the motion of the vortices. Give a plot of the trajectory of each vortex for $t \in [0, 100 \text{ s}]$. On a log-log plot, plot the root-mean-square error of the position of one of the vortices as a function of time.
2. Consider one hundred of the same ideal point vortices, evenly distributed on the x axis from $x \in [-1, 1]$. For $t \in [0, 100 \text{ s}]$, plot the trajectory of the vortex initially at $x = 1$. Plot the distribution of vortices at $t = 100 \text{ s}$.