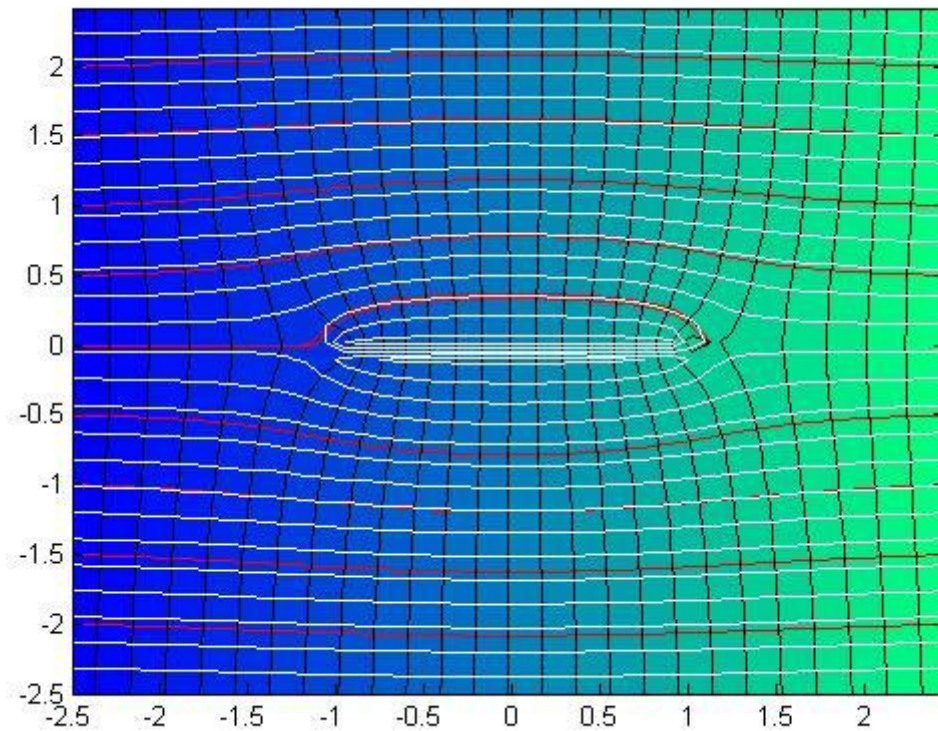# AE- 625 -Particle Method for fluid flow simulation Assignment1

Report

Q1: Plot the streamlines and potential lines using the complex potential generated by this.
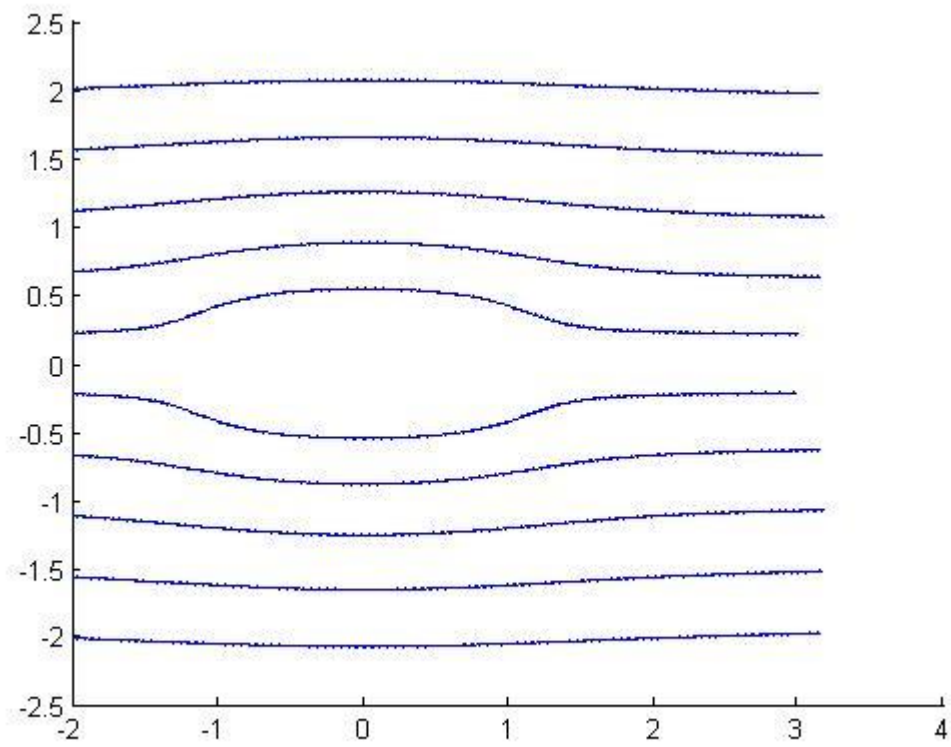
Following Plot was obtained.

Q2: Now consider a set of tracer points starting at x=-2 (consider a line with say 10 points between y=-2 to 2). Find the trajectory of these tracer points by integrating them given the velocity of the points. Use both an Euler integrator and a Runge-Kutta second order to study the results.
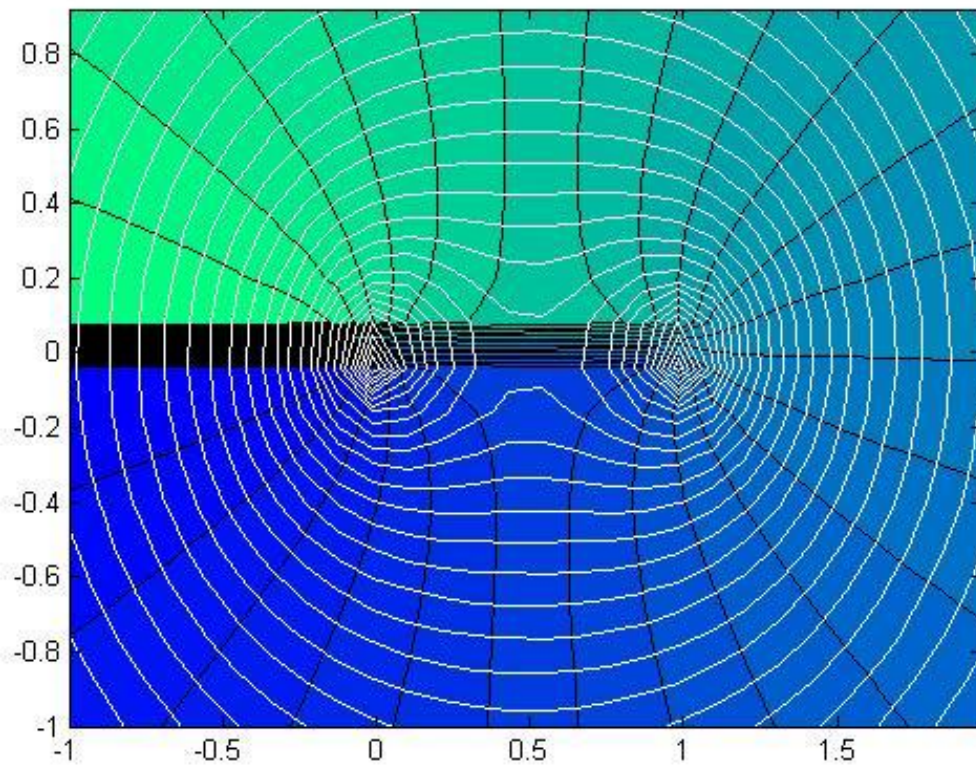
By Euler Method:
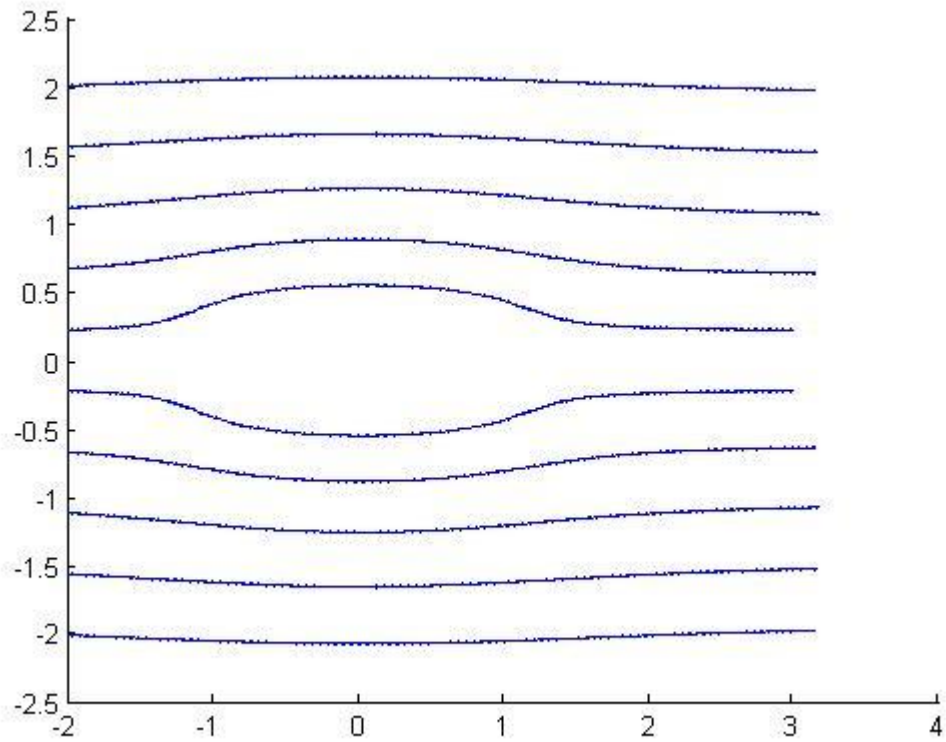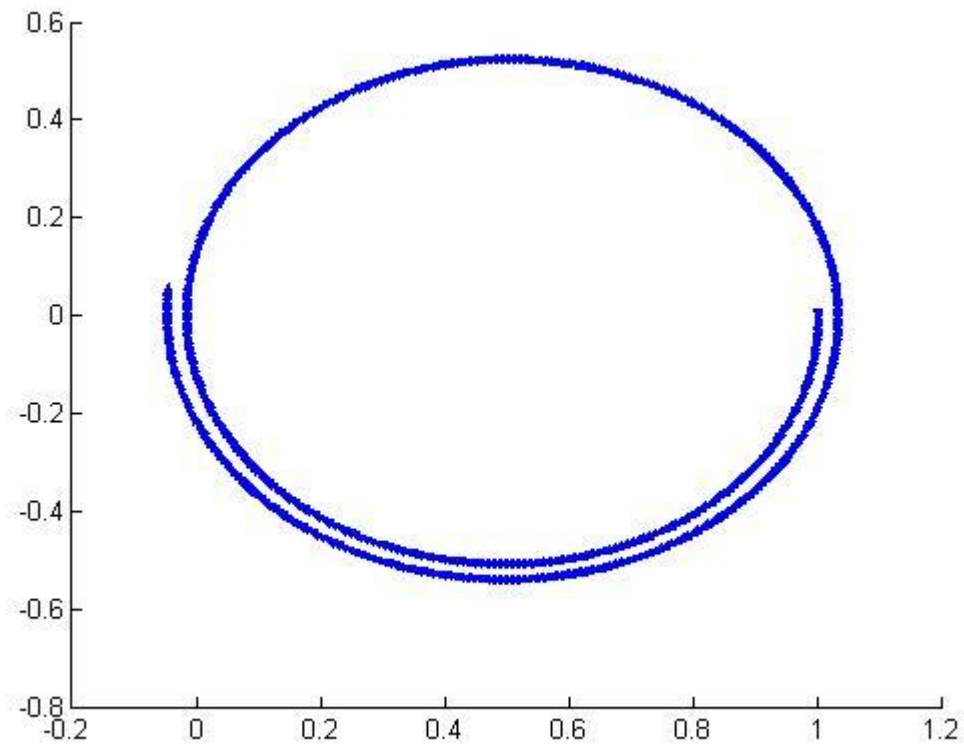
By Runge Kutta Order2 Method:

Q3. Consider the motion of two point vortices in isolation. Consider two vortices of the same sign and strength = 2*pi. Place them a unit distance apart. Integrate the motion of these vortices in time and use the exact solution to test your implementation of the integrator. Test the implementation of Euler and RK2 with this. Study the convergence of the two integrators as you reduce the time step used for the integrator.
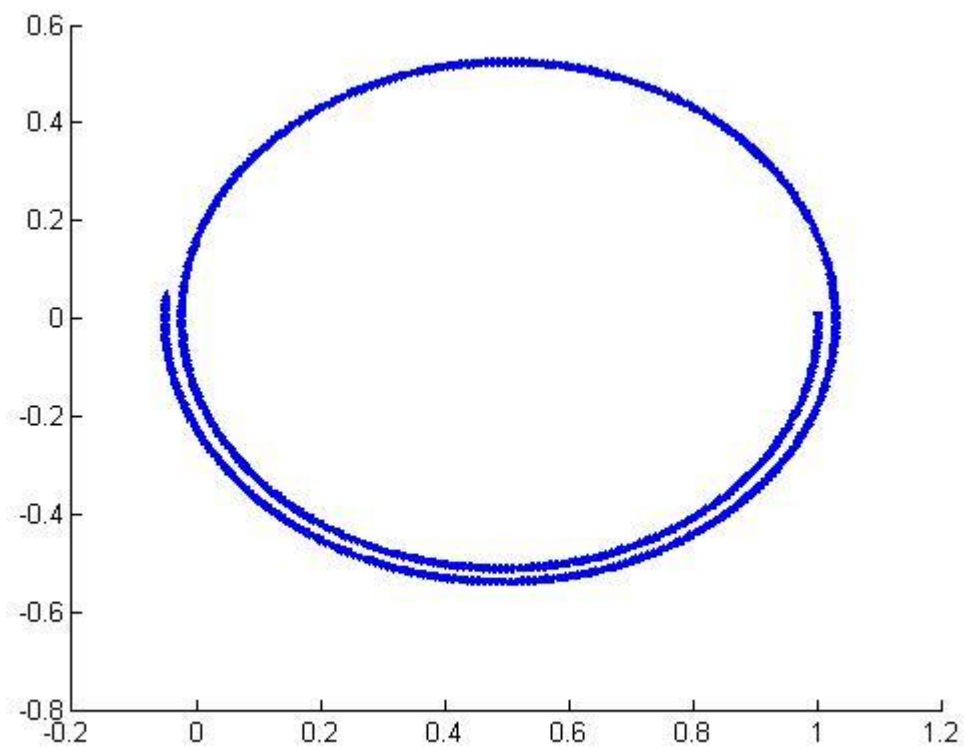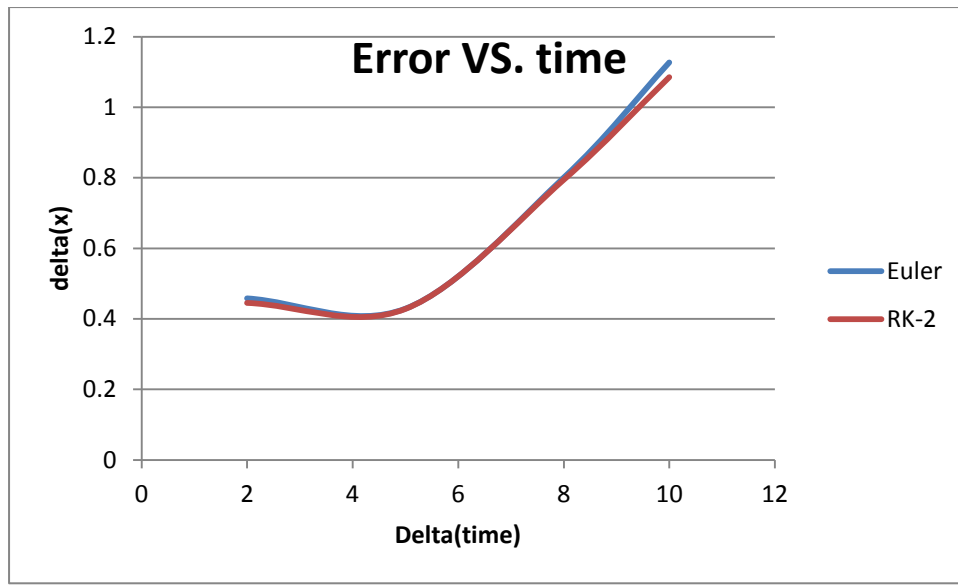
Plot Using Exact Solution:

By Euler Method: (5sec)

By Runge Kutta Order2 Method:(5 sec)

As we can see, Runge Kutta method has less error than Euler's Method. Though Error increases with number of simulations since Numerical error increases with each iteration.