This programming assignment requires the implementation of a basic flocking system in OpenGL. An existing OpenGL application on the course Web site (http://www.cs.siue.edu/~wwhite/CS382/Syllabus.htm) implements an interaction between the user and one thousand delta-shaped “ships”. The ships are initially stationary, with random positions, orientations, and colors.

The user creates “ripples” via the computer mouse, and these ripples impose movement on the ships that they touch. Keyboard controls allow the user to control the color of the ripple being generated. Ripples only affect the position of ships with the same color, except in the case of “invisible” ripples, which affect all ships with which they come into contact. Example scenes are illustrated below.

Your assignment is to expand this program to provide the ships with flocking behavior:

- Each ship should be provided with a randomly generated initial velocity, and should be altered to “bounce” off the display window’s sides to remain in view.

- Ships will be driven by three basic steering behaviors:

  - **Cohesion**: Each ship will steer to move towards the average position of its local flockmates (i.e., all like-colored ships within a specific distance of the ship).

  - **Alignment**: Each ship will steer towards the average heading of its local flockmates.

  - **Separation**: Each ship will avoid crowding its local flockmates by steering away from its nearest local flockmate.

- Keyboard controls should be added to allow the user to increase or decrease the intensity of each steering behavior (K/k for cohesion, A/a for alignment, and S/s for separation). Current intensity levels must be indicated in the title bar of the display.
• The mouse operation to disrupt the positions of particles via user-generated ripples should be maintained. An executable version of the required revision is available on the course Web site. Screenshots of the provided executable are displayed below:

Your program is expected to behave in a manner similar to the provided executable. Please consult the instructor for assistance with your OpenGL coding. Any code obtained from classmates, tutors, other individuals, or on-line sources is considered academic misconduct. You must write your own code, and no one but the instructor may see your code. Zip-compress your entire project file and copy it to your Moodle dropbox by Thursday, April 20, 2017, at 2:30 PM. Late assignments are not accepted without verifiable medical documentation.