13. HW 4
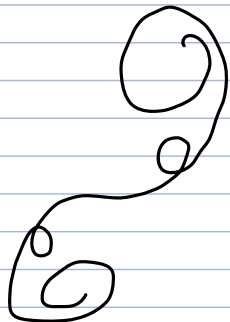
Vortex Patterns

① How do I produce vortex patterns in my fluid simulation?

Note: K is the vorticity strength variable.

① Make sure that the positive and negative vorticity strengths add up to $+1$ and -1, respectively.

For example, if you have 100 particles with positive vorticity strength and 50 particles with negative vorticity strength, you should set each positive-strength particle to have

$$K = \frac{1}{100}$$

and each negative-strength partice to have

$$K = -\frac{1}{50}.$$

Troubleshooting tips

② My simulation is exploding. What should I do?

② (i) Try initializing the velocity field to zero at every time step before you update it.

(ii) Try decreasing the time step.

(iii) Verify that the vector $\phi_p - \phi_q$ is properly rotated by $90°$.

③ How do I make my simulation look more realistic and visually compelling?

③ (i) Try increasing the number of particles to make the particle distribution denser.

(ii) Assign different colors to the positive and negative vorticity strength particles.