

Wave Particles with Interactive Vortices

CIS-565 GPU Programming Final Project

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This project is inspired by the demo created by Jean-Philippe Grenier from Ubisoft [1]. The demo uses wave particles to create water surface and generates flow map in real-time to advect the particles which enables the user to create some interesting vortices on the fly.

Goals:

1. Simple wave particle rendering.
2. Combine wave particle with flow map.
3. Update flow map in real-time.
- *4. Identify and solve the problems caused by advection of height, uv, normal.

* = extra features

Milestones:

Milestone 1:

- a. DX12 frame work
 - Compute shader
 - Tessellation shader
 - Basic Interaction
- b. Basic wave particle rendering
 - Single particle

Milestone 2:

- a. Advanced wave particle rendering
 - Multiple particles
 - Particle boundary interaction
 - User interaction (create bump or dent)
- b. Combine flow map with wave particle
 - Find some interesting flow maps
 - Use flow map to advect wave particle
- c. Improve rendering method
 - Foam
 - Subsurface scattering

Milestone 3:

- a. Update flow map in real-time
 - 2D Fluid simulation
 - Create blockers (rocks and etc.)
 - Advect properties using simulation result

Final:

- a. Finish unfinished work
- b. Identify and solve the problems caused by advection of height, uv, normal

References:

- [1] <https://80.lv/articles/river-editor-water-simulation-in-real-time/>
- [2] http://advances.realtimerendering.com/s2016/s16_ramy_final.pptx