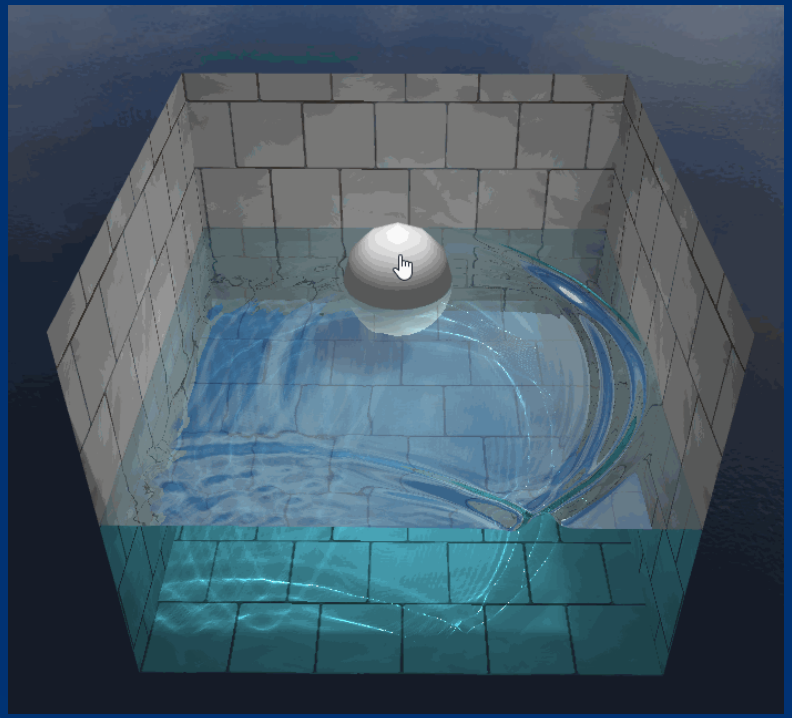
# WebGL Interactive Water

Beta



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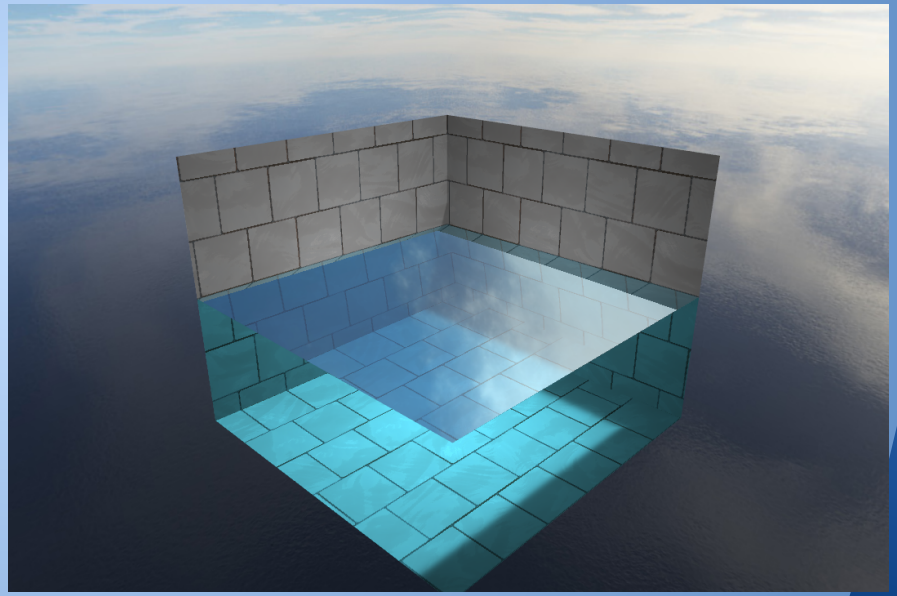
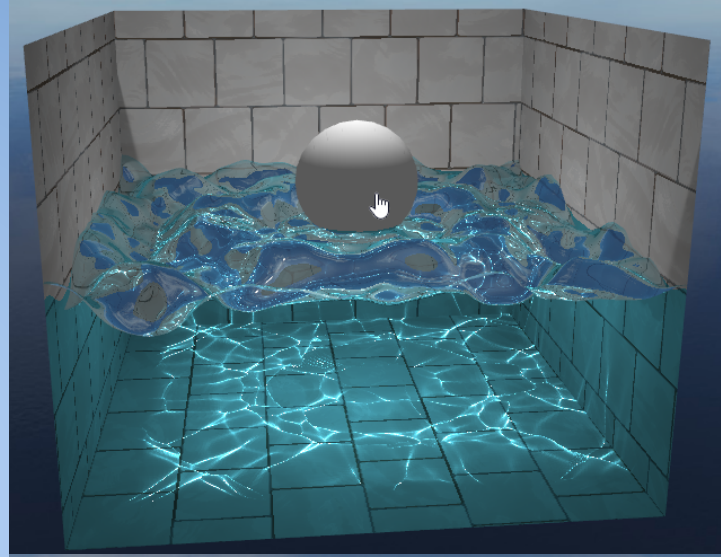
# Alpha Features

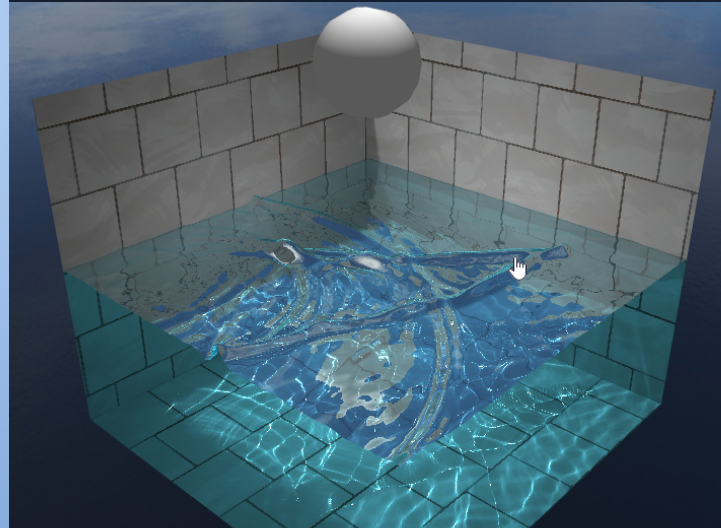
- Framework from scratch
- Environment - Pool, Sky
- Still Water Shader
- Soft Shadow
- Reflection/Refraction
- Mouse Click Raytrace



# More in Beta

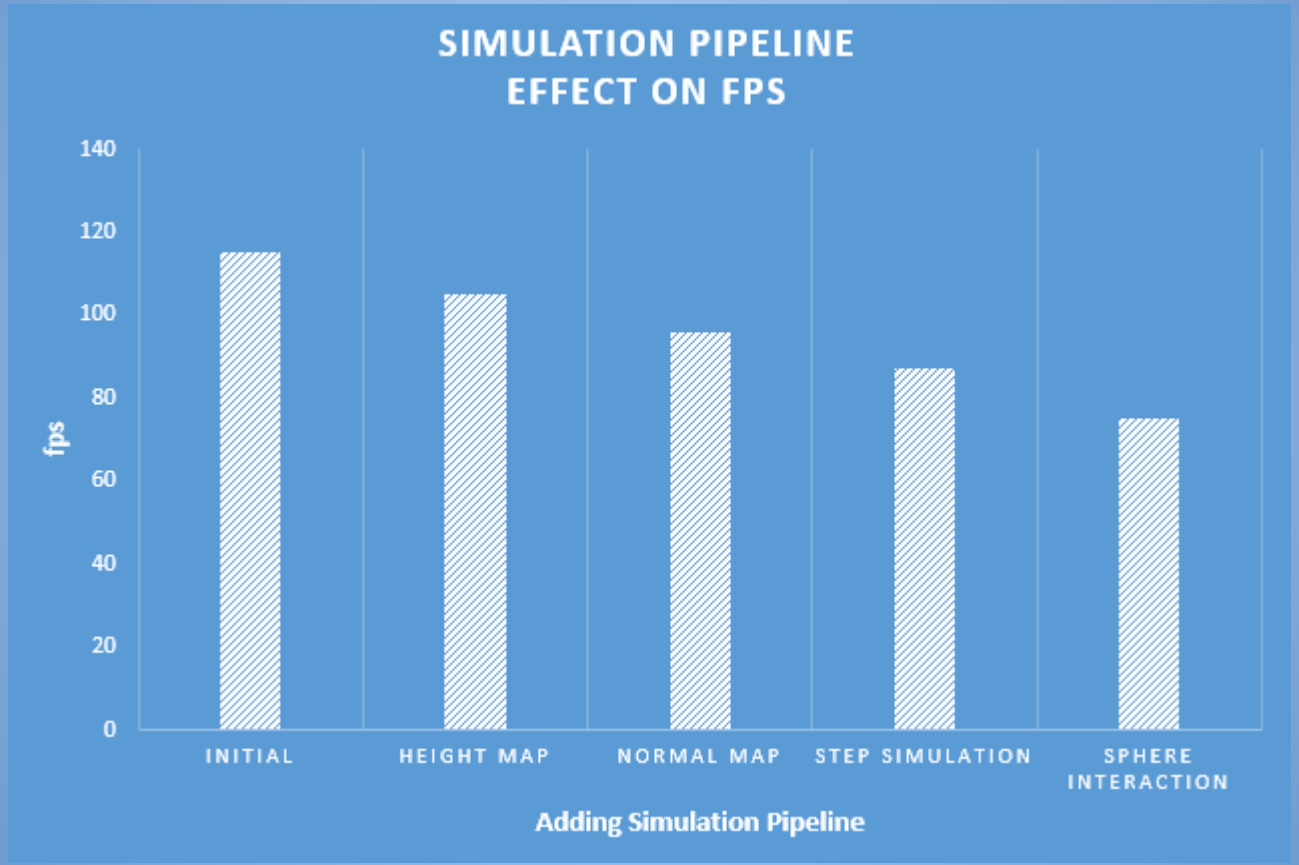
- Water Simulation
- Height Field
- Sphere, Mouse Interaction
- Caustics





# Water Simulation

- Simulation Data
  - gl.RGBA gl.FLOAT texture [height.y, normal.x, normal.z, speed.y]
- Simulation Shaders
  - **Height Map shader:** **height.y** is updated by mouse click/sphere movement.
  - **Normal Map shader:** normal.x and normal.z is updated with new height information. normal.y can be recovered when used.
  - **Step simulation:** speed.y is calculated. the speed is also attenuated to eventually stop the wave pattern.
- Water Mesh Shader
  - [height.y, normal.x, normal.z, speed.y] is passed into water mesh shaders as useful information to render out the water simualtion.


SIMULATION PIPELINE
EFFECT ON FPS
140
120
100
80
60
40
20
0
fps
INITIAL
HEIGHT MAP
NORMAL MAP
STEP SIMULATION
SPHERE INTERACTION
Adding Simulation Pipeline

# Caustics

- Caustics result from light rays reflecting or refracting from a curved surface and hence focusing only in certain areas of the receiving surface
- Two assumption:
  1. Sun is directly above
  2. floor is lit by rays emanating vertically above the point of interest
- Calculate two refract rays, one is using vertical normal and the other is using the real normal
- Write caustic value to caustic map

# Demo

http://dblsai.github.io/WebGL-Fluid

# Future Work

- More obj interaction
- User input(change force, light position etc.)
- Other water shader effects
- Wind and rain drop effects