Zibra Liquids 1.3, plugin documentation

Zibra Liquids is a plugin for Unity engine. It allows the use of real-time fluid simulation (GPU) powered by AI based object approximation.

Note, if you're using Zibra Liquids free version, it has the following limitations:

Features	Zibra Liquids free	Zibra Liquids
Analytic colliders (simple shapes like cubes, spheres and bowls)	up to 5	unlimited
Voxel colliders	✗	✓
Force interaction setting	✗	✓
Fluid emitters	1	unlimited
Fluid voids	✗	✓

Table of contents:

1 Creation of ZibraLiquid simulation

2 Adding colliders

3 Main simulation parameters

4 Solver parameters

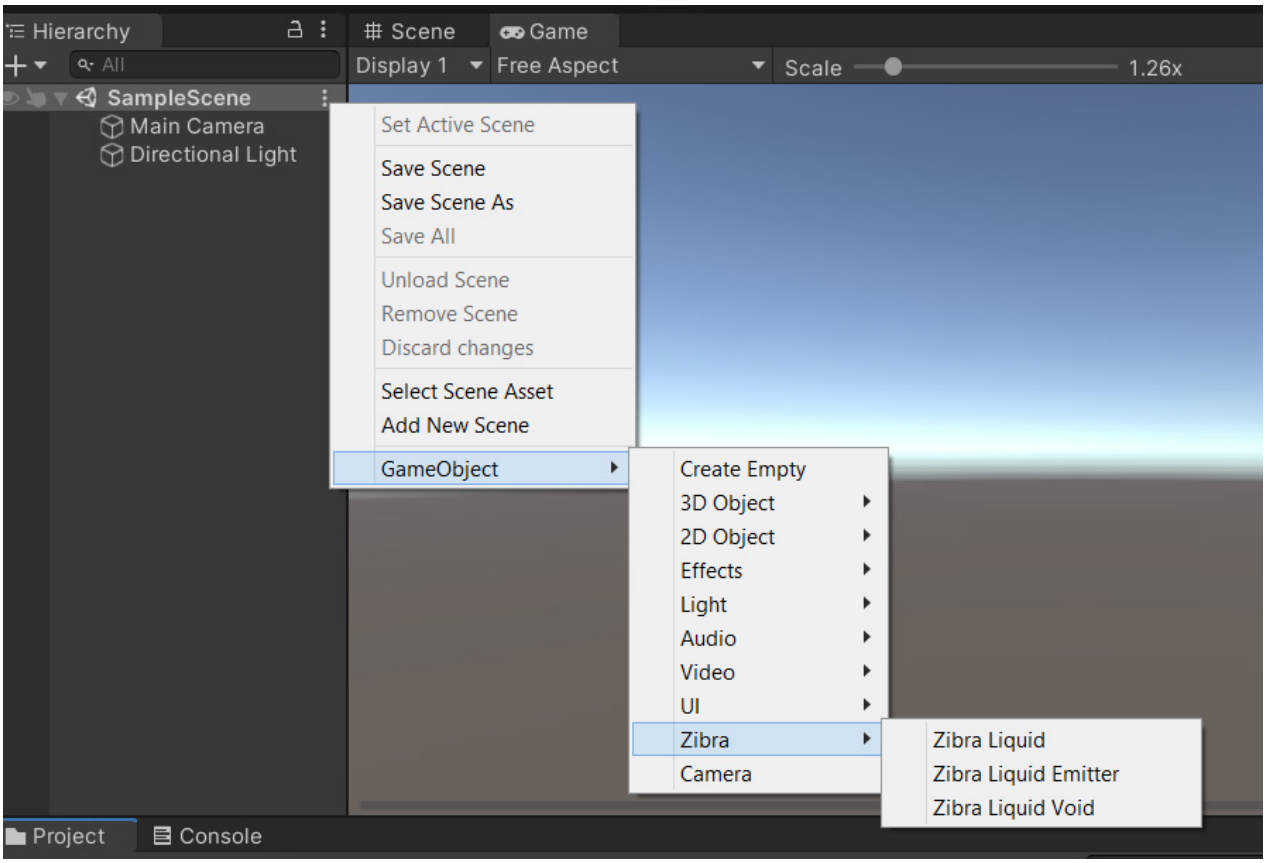
5 Material parameters

6 How to set up URP and HDRP

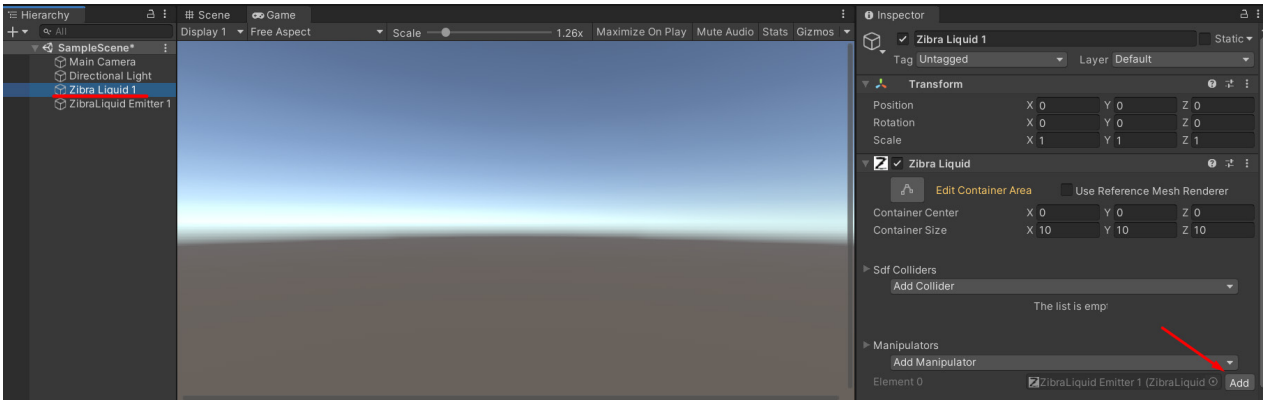
7 Recommended system requirements

1 Creation of ZibraLiquid simulation

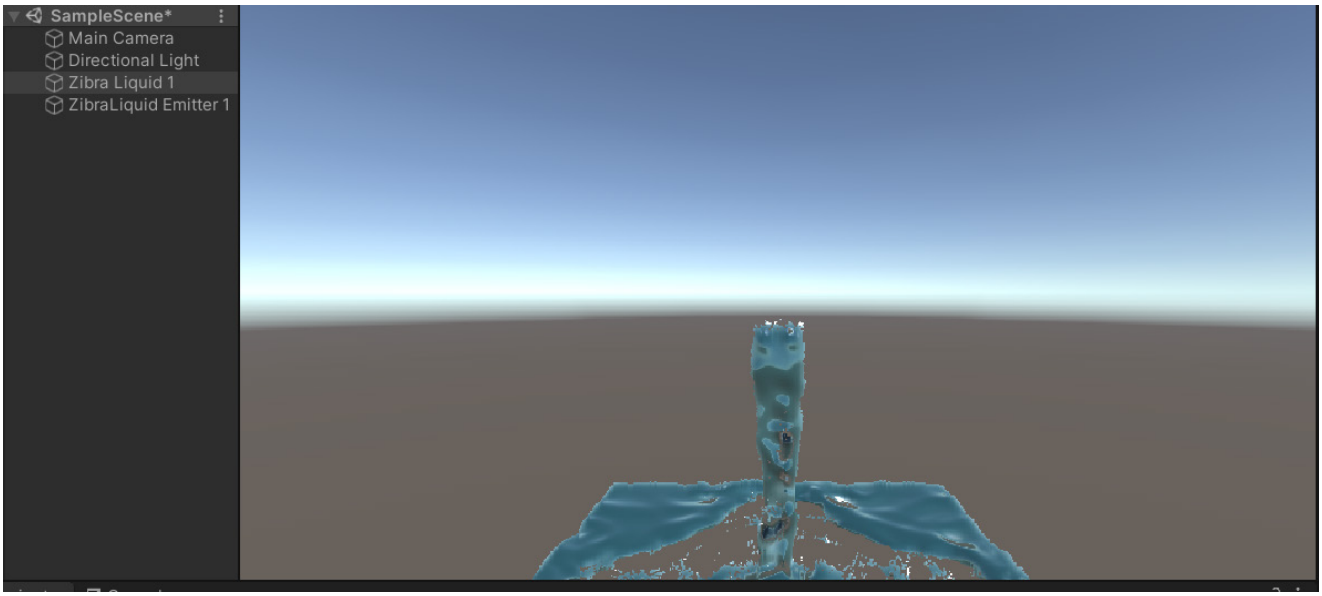
To create a ZibraLiquid simulation you need to add two Zibra game objects:
1. Zibra Liquid
2. Zibra Liquid Emitter
To do that go to the SampleScene dropdown menu - *GameObject - Zibra - Zibra Liquid:*



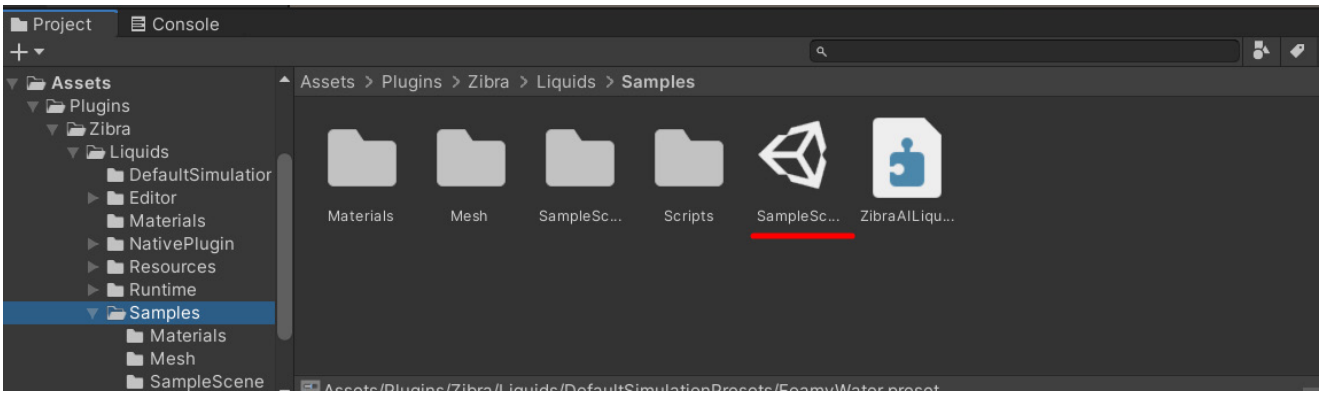
When the both objects have been added, select ZibraLiquid 1 and in the Manipulators menu press Add to enable ZibraLiquid Emitter 1:



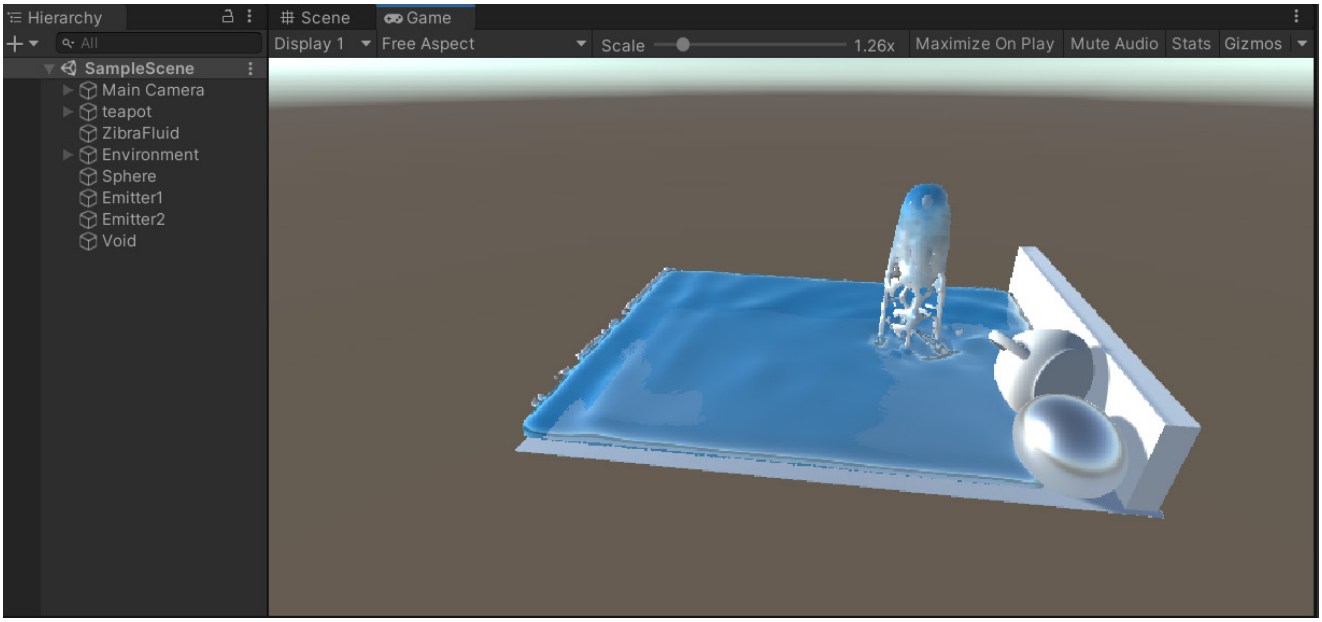
This is a minimum required setup, press play button and you will see the fluid in action (it flows inside of the invisible box):



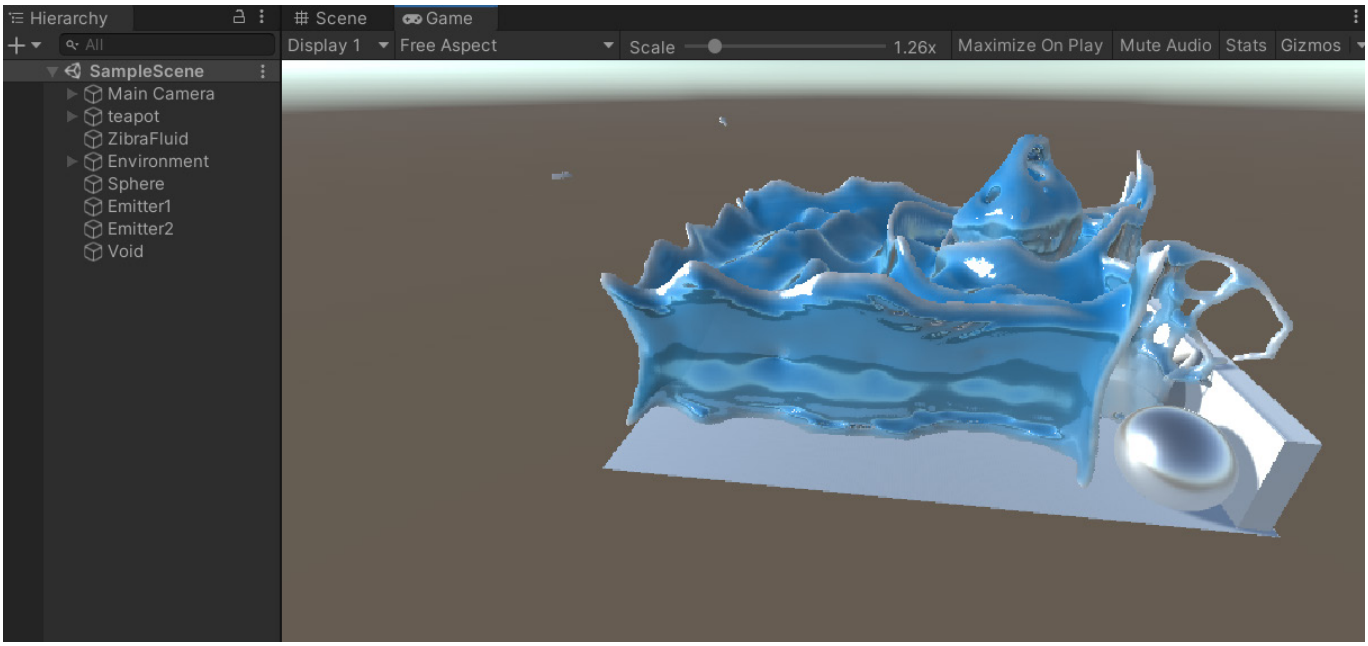
Also, you can check out how the fluid works in the built-in demo scene. To do that go to *Assets - Plugins - Zibra - Liquids,* select *Samples* and open the *SampleScene.*

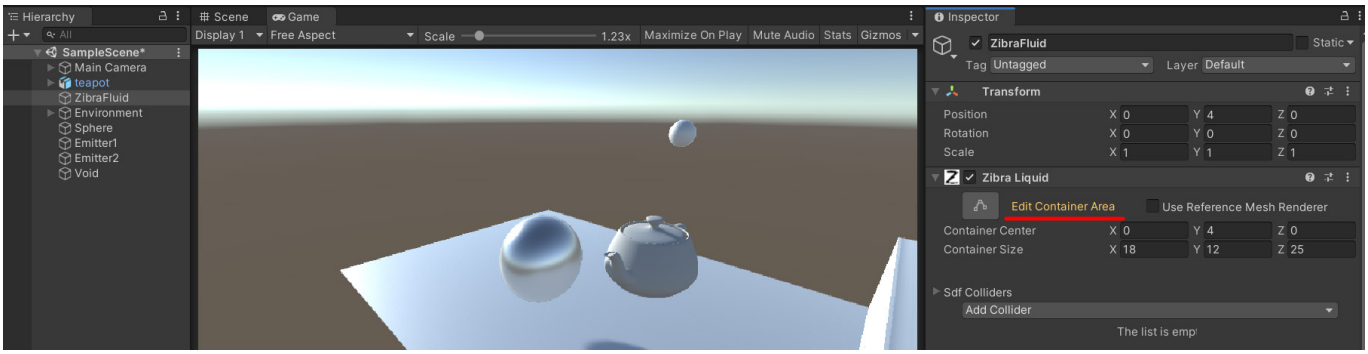


Now you can play the fluid:

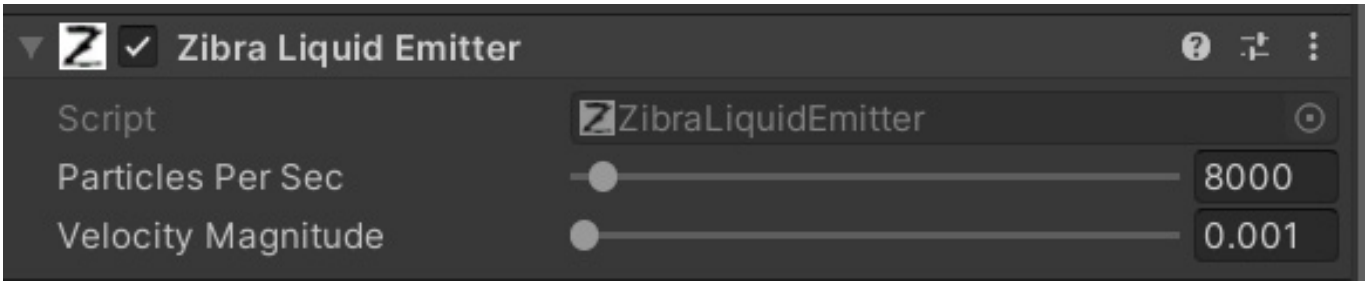


Feel free to use auto-enabled free camera script, just use WASD controls to move the camera around the scene.
The arrow keys control the gravity inside of the scene and “O” turns the gravity completely off.

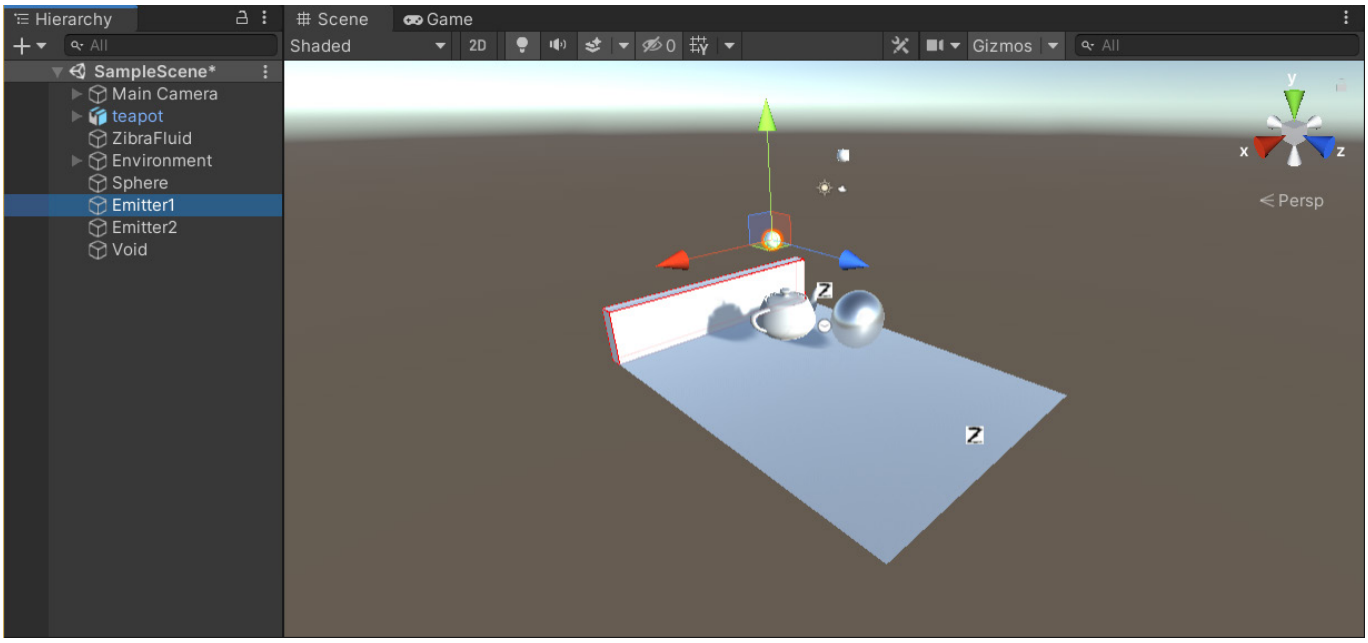




By clicking on the “Edit Container Area” button you can manually change its position and size in the scene editor. Also, you can use a reference object bounding box by checking the “Use reference mesh” checkbox, after which you should add the object of interest as the reference.
The emitter parameters define how the simulation is initialized.

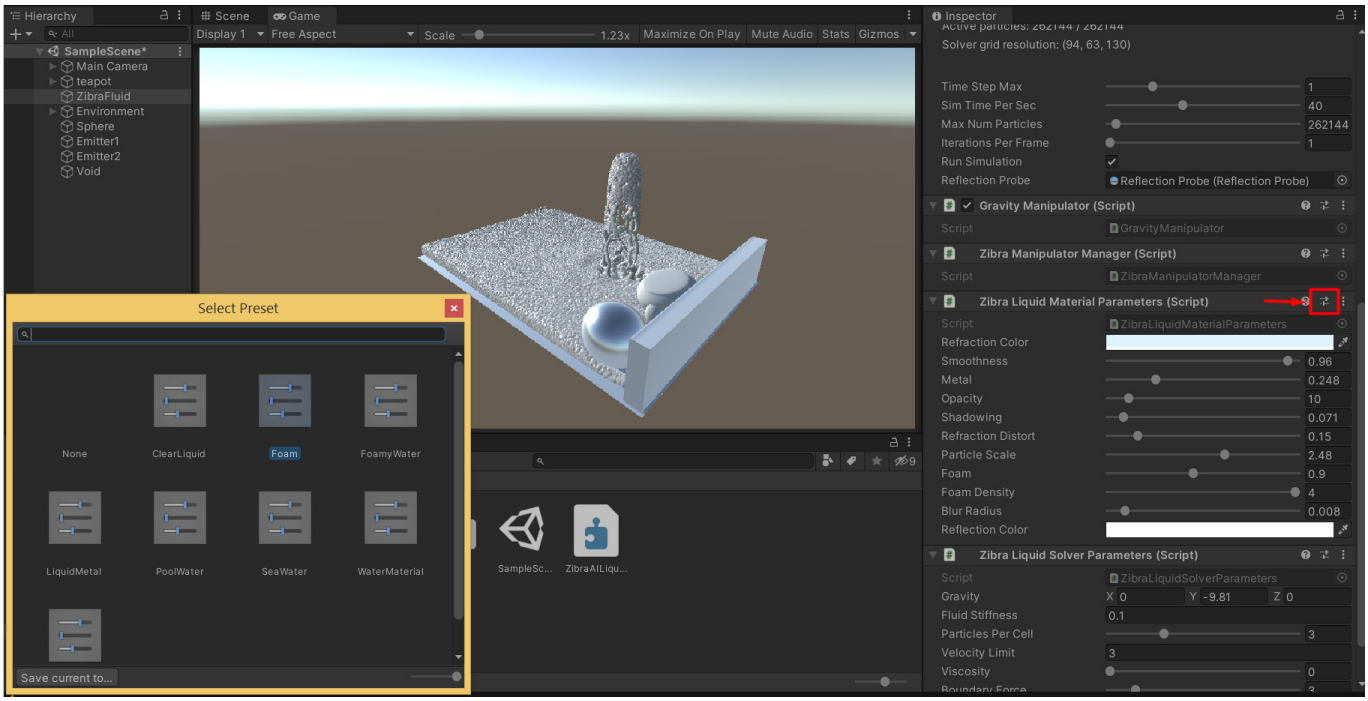


The sliders allow you to adjust the number of particles generated by emitter per second and its velocity.
You can use gizmo controls to replace and turn the emitter in the desired direction.

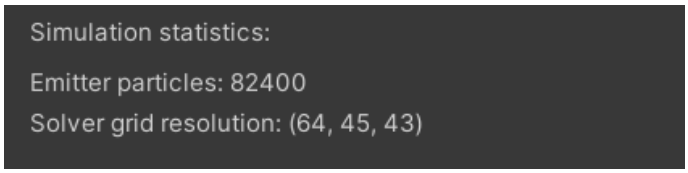


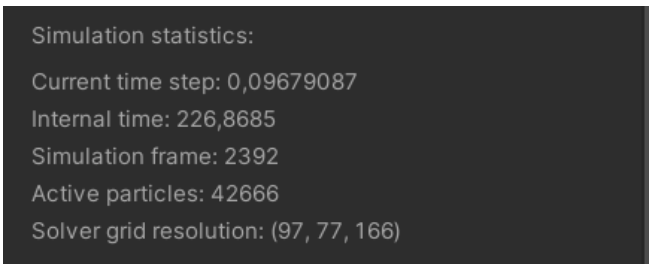
By using a default simulation preset you can simplify the setup process to create a specific type of simulation. Then you can finetune the parameters to your liking.

To apply different presets select ZibraFluid object and click the Slider icon in the Material Parameters menu:



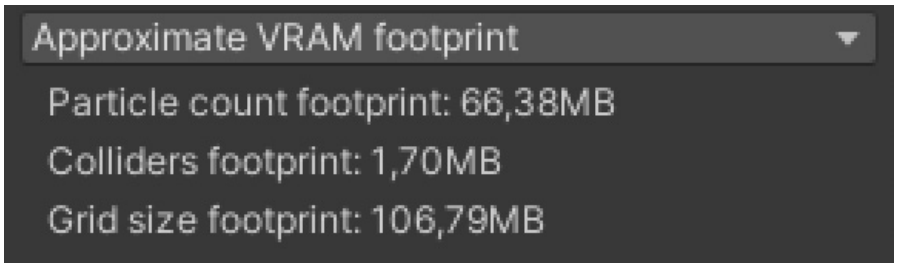
Now you can apply any preset even on the go in the Game mode.





In editor mode ***In game mode***

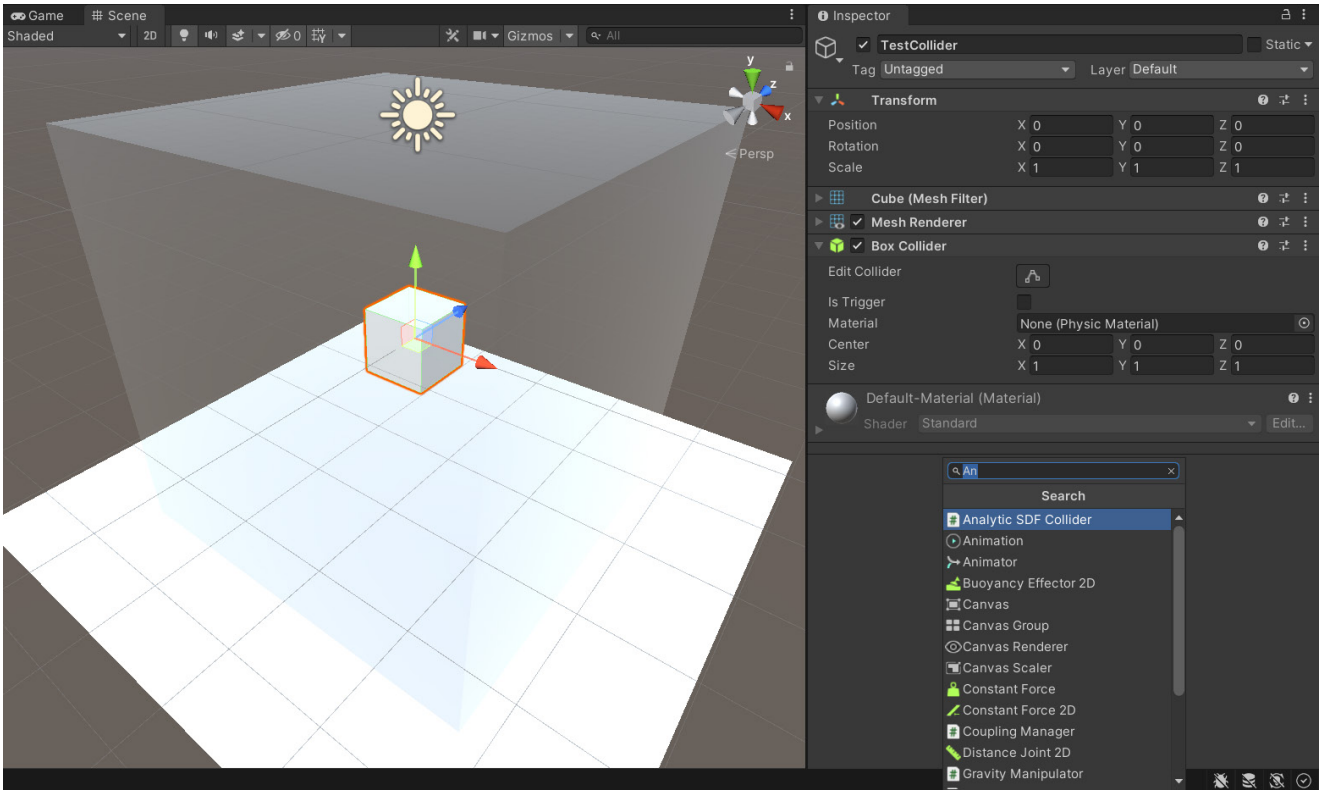
The simulation statistics gives general information about the simulation. Based on the emitter size and density the number of particles is calculated and shown here. The solver grid resolution is calculated based on the cell size and the container size, to get a higher quality simulation you need to reduce the grid cell size, but it is recommended to keep the grid resolution smaller than (256,256,256) due to memory limitations of the current solver implementation.

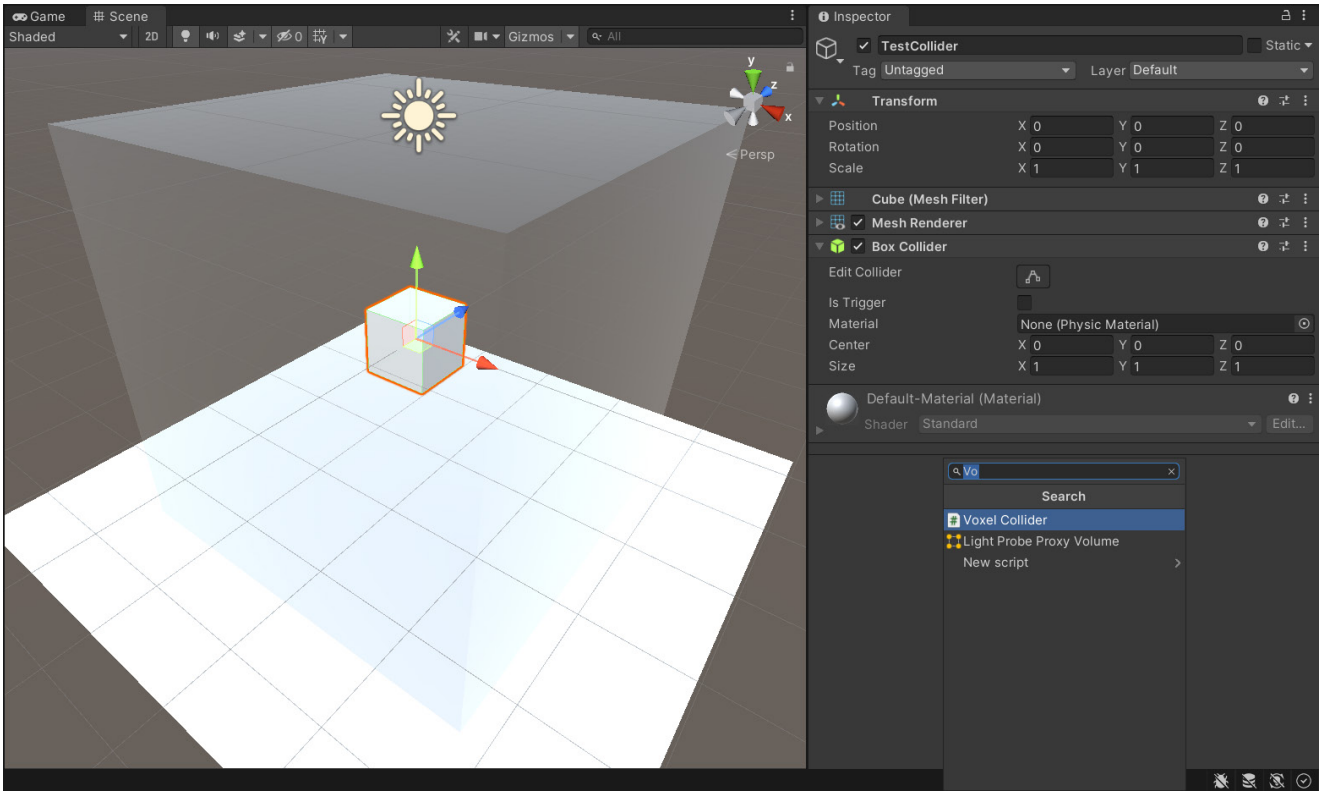


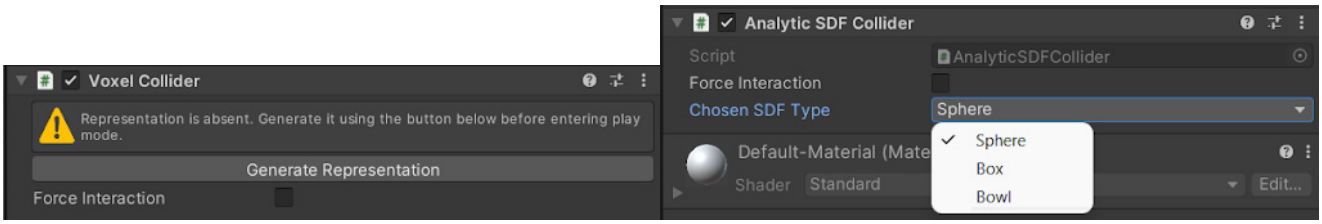
VRAM footprint lets you know how much VRAM will be used by any particular instance of Zibra Liquid or Voxel Collider.
Particle count footprint - scales with Max Num Particles parameter
Colliders footprint - is a sum of voxel collider footprints.
Grid size footprint - scales with Grid resolution parameter.
If you have performance problems you can see which parameter contributes to VRAM usage the most.

2 Adding colliders

To add objects the solver can interact with, you first need to first add a Voxel Collider/Analytic SDF Collider component to the object of interest. After that depending on the type of component, you can either generate a Neural SDF representation of the object, for the Voxel Collider component, or select one of analytical SDF types.

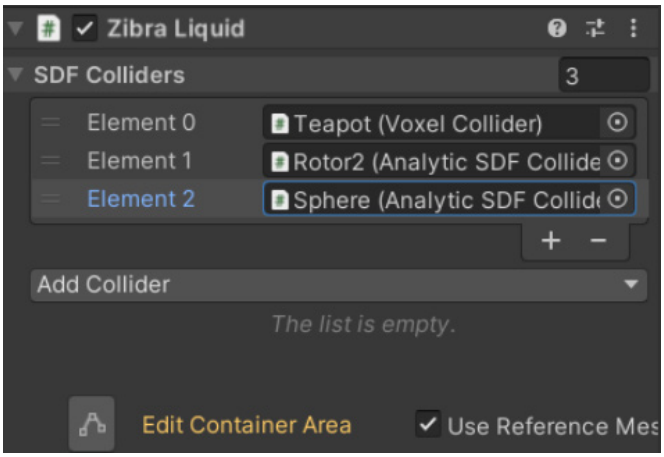






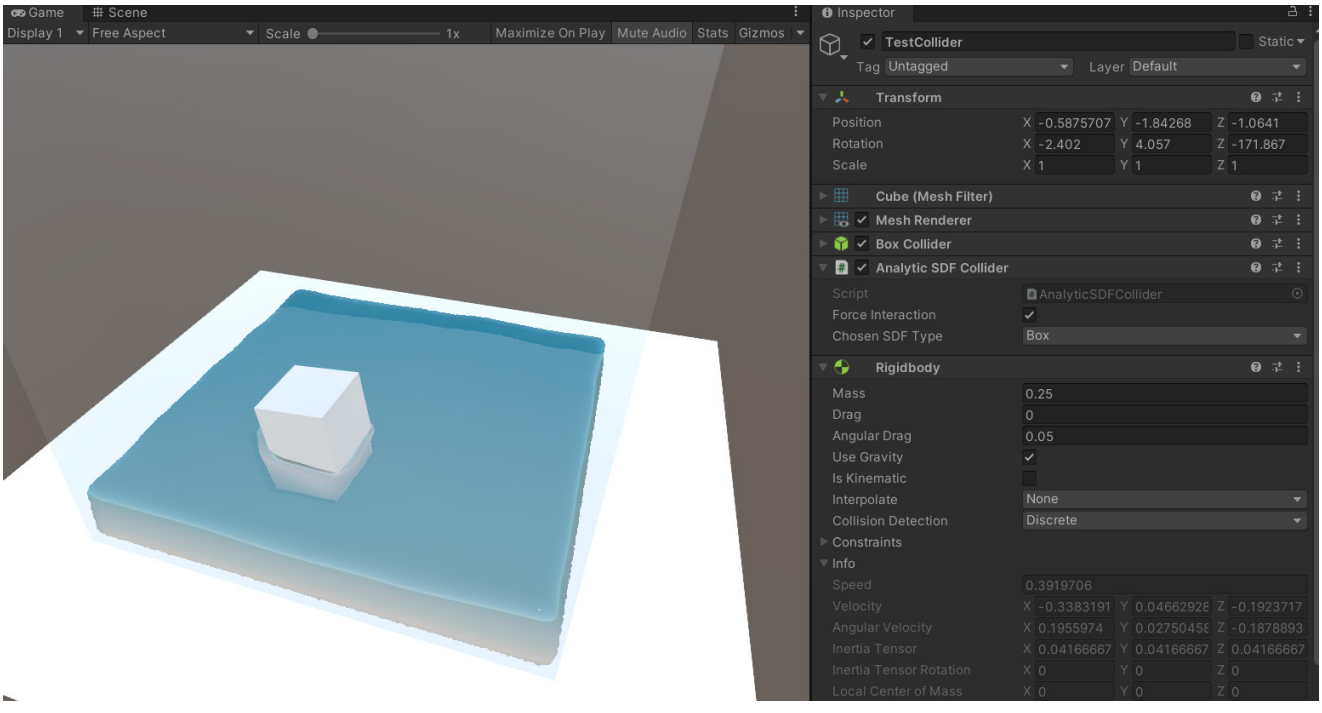
Voxel Collider Component
(it is not available in the free version of the plugin)

Analytical SDF Collider

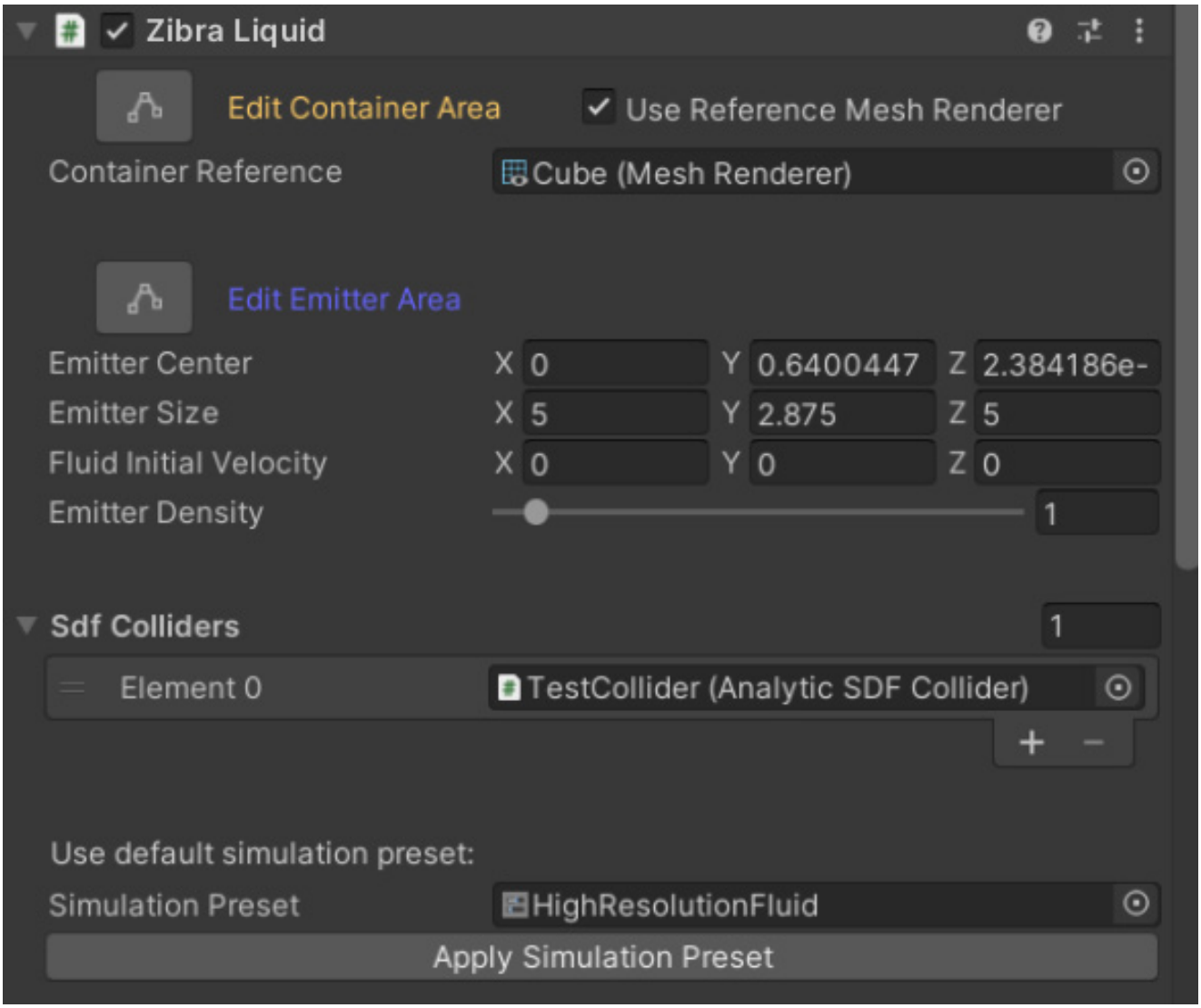


You can also turn on “Force interaction”, this allows the fluid to interact with rigid bodies. For this to work, the object needs to also have a rigid body component.

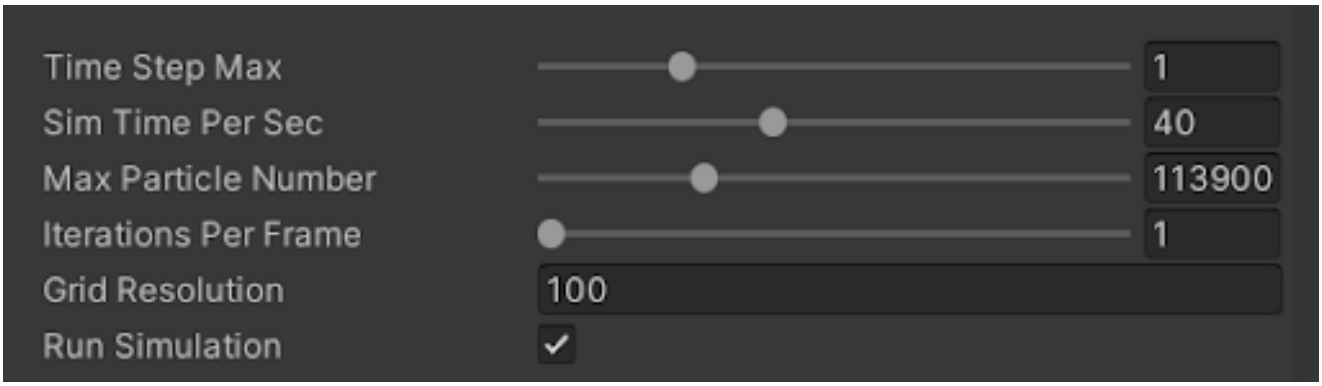
Note, that the Force interaction feature is not available in the free version of the plugin



Then for a ZibraLiquid instance to interact with a collider it needs to be added to the SDF Colliders list in the ZibraLiquid component settings.



3 Main simulation parameters

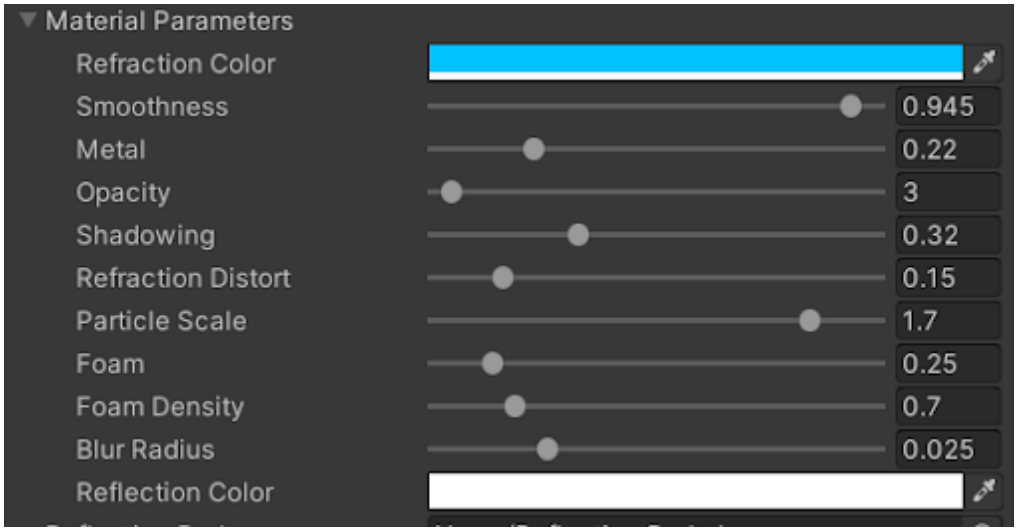


- **TimeStepMax** - The maximum allowed simulation timestep. The higher the max timestep is the less stable the simulation might get.
- **SimTimePerSec** - The speed of the simulation, how many simulation time units per second.
- **MaxParticleNumber** - The maximum allowed particle number.
- **IterationsPerFrame** - The number of solver iterations per frame, in most cases one iteration is sufficient.
- **Grid Resolution** - Main parameter that regulates the resolution of the simulation. Defines the size of the simulation grid based on the largest side length of the simulation container. The actual grid resolution is given in the simulation statistics section.

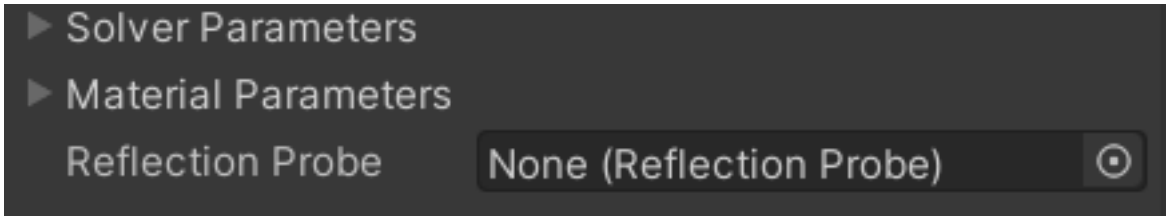
4 Solver parameters

- **Gravity** - The strength and direction of the gravity, given as a Vector3
- **Fluid Stiffness** - The stiffness of the fluid, recommended 0.1f. The higher the value the more incompressible the fluid becomes.
- **Particles Per Cell** - The average number of particles per grid cell, the higher the value the more accurate the simulation becomes. But for the same volume of fluid you will need a higher number of particles.
- **Velocity Limit** - The velocity limit of the particles, in grid cells per simulation time unit.
- **Viscosity** - Defines how well the simulation preserves the energy of the fluid.
- **Boundary Force** - The strength of the force acting on a fluid while its touching objects.

5 Material parameters



- **RefractionColor** - The color of the fluid volume
- **Smoothness** - The smoothness of the fluid surface
- **Metal** - The metalness(reflectivity) of the surface
- **Opacity** - The opacity of the fluid volume
- **Shadowing** - Fluid depth dependent darkening of the color
- **Refraction Distort** - The amount of refraction distortion
- **Particle Scale** - Particle rendering scale compared to the cell size
- **Foam** - intensity of a foam effect.
- **Foam Density** - the density threshold of the foam, sets a maximal density below which the foam can be seen.
- **Blur Radius** - the relative radius of a screen space bilateral blur of the particle normals and depth.

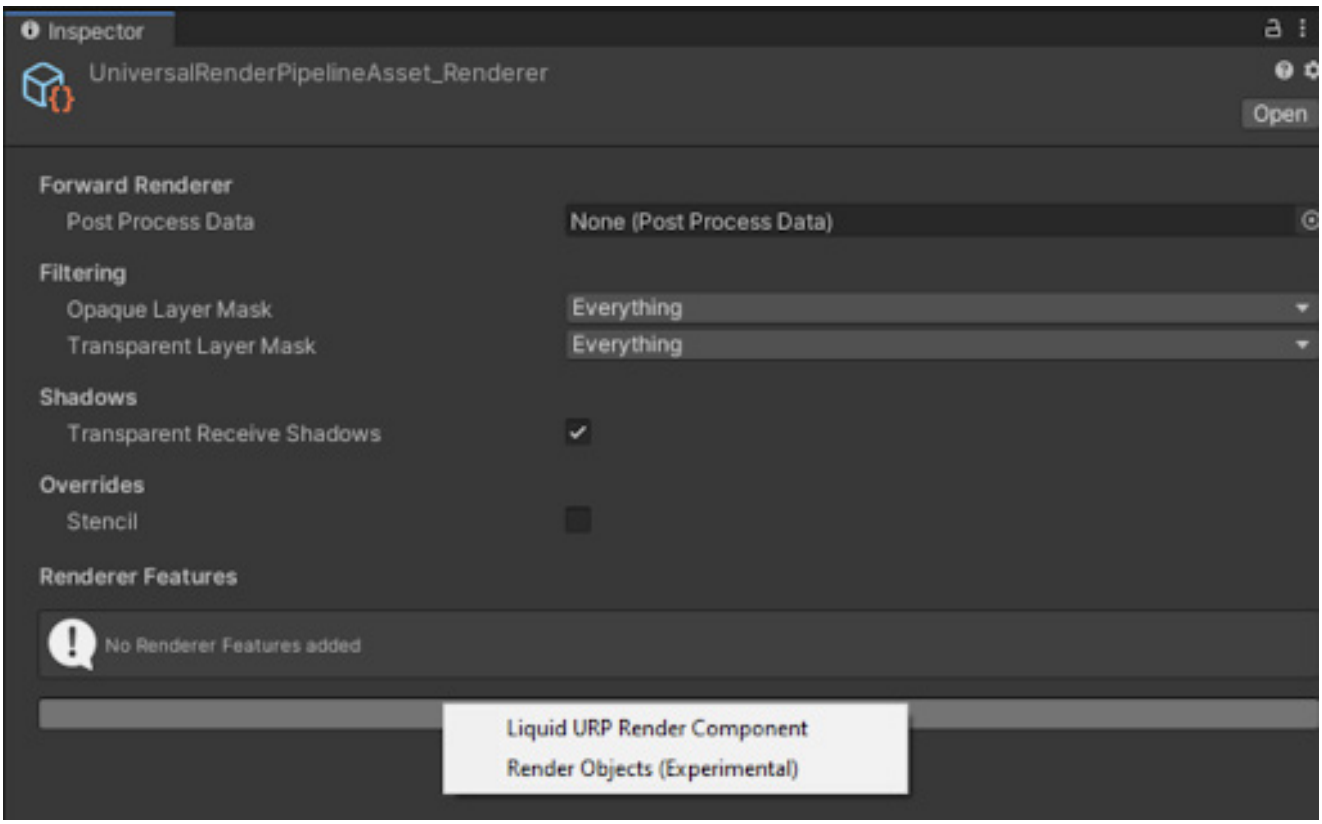


You can also specify a custom reflection probe which will be used in the fluid rendering instead of the default Unity one.

6 How to set up URP and HDRP

URP

You need to add a New Liquid URP Render Component to your URP Renderer setting.
For newly created Unity projects that use the URP preset, these settings are located in Settings/ForwardRenderer.



HDRP

For correct fluid visualization on HDRP users must set proper scene light. Also note that Reflection Probe is not accessible in HDRP in Custom shader and thus it is not currently supported.

7 Recommended system requirements

Platform: PC (mobile is coming soon)

DirectX: 11

Unity version: 2019.4 or later (use the latest feature update)

URP: 7.5 or later

HDRP: 7.x or later