Example Scenes

The following samples illustrate the usage of different features in Chaos Phoenix.

Rocket

Scenes (286 MB)

This scene demonstrates how to set up a rocket launch scene using Phoenix. A Fire Source in **Volume Inject** mode is used for the smoke emission from the rocket and the boosters. Another two Fire Sources in **Volume Brush** mode are used to change the **RGB** color of the smoke near the ground to give it more variation. Since the scene has a lot of geometry and we wish only a few parts of it to interact with the simulation, the Scene Interaction is set to Include list and only the objects relevant to the simulation are picked. For the rendering the Smoke Scattering is set to **Ray-traced** in order to get more realistic scattering of the light through the smoke. The **Phase Function** for the smoke is set to **0.7** so that the light can scatter more and give the lighter smoke steam appearance. The scene contains a primitive called *"Blocker"* which is a **Solid Object** until frame 74 and holds the smoke generated by the Boosters below the Launchpad, after frame 75 the Blocker is set to a **Non-Solid Object** and the smoke can start travel upwards.

The attached example scene with higher resolution has a starting **Grid Resolution** of **12 million cells**, **Voxel Size** of **0.203m** and **Adaptive Grid** set to **Smoke**, so the Grid will automatically expand when it's needed. The **Grid Resolution** reaches **1.5 billion cells** in its final stage at **Frame 300**.

The attached example scene with lower resolution has a starting **Grid Resolution** of **1.7 million cells**, **Voxel Size** of **0.397m** and **Adaptive Grid** set to **Smoke**, so the Grid will automatically expand when it's needed. The **Grid Resolution** reaches **357 million cells** in its final stage at **Frame 300**.

The example videos below demonstrate the results with two **Grid Resolutions** scaled to **1.5 billion cells** and **357 million cells**.

Software used: **Phoenix 5.01.00 Nightly from 27 Sep 2022, V-Ray 6 Official Release, Maya 2019**

Grid Resolution of around 1.5 billion cells, simulated on a machine with 256GB of RAM

Grid Resolution of around 357 million cells, simulated on a machine with 64GB of RAM

Volcano

Scene (49 MB)

This setup uses a few Sources with animated noise textures as masks for the discharge so that the smoke and fire emission are randomized. In order to get a good rolling from the smoke, high **Conservation Quality** is used, along with **PCG Symmetric** conservation.

To add detail to the initial simulation of a relatively low resolution, make sure to enable the Resimulation and run the simulation again.

Software used: **Phoenix 4.41.02 Nightly from 4 Nov 2021, V-Ray 5 Update 1.1, Maya 2018**

Static Clouds

Scene (8.24 MB)

This scene demonstrates how to set up a static clouds scene using Phoenix. A Fire Source in Volume Brush mode is filling the cloud shaped emitter geometry over time. The smoke channel is mapped with a noise texture in order to give the cloud shape more randomized and wispy look. The Input is set to Cache Index mode so that a single cache file will be used through the whole animation sequnce. For the rendering the Smoke scattering is set to Ray-traced in order to get more realistic scattering of the light through the clouds.

Software used: **Phoenix 4.41.00, V-Ray 5 Update 1.1, Maya 2018**

Looped bubbles

Scene (137 kB)

When creating flowing and repeated effects such as fireplaces, campfires or torch fires, water in fountains, waterfalls or boiling liquid you can save a pretty good amount of simulation time by rendering a short looped sequence. In the Input roll-out, simply select the **Loop** mode in the Time Bend Controls and adjust the looped sequence. In this mode, the **Cache Origin** parameter specifies the beginning of the looped sequence, the **Length** parameter specifies the length of the loop, and **Loop Overlap** specifies the number of overlapped frames that ensure smooth transition between the end and the start of the loop. Note that you need to have simulated at least **Cache Origin** + **Length** + **Loop Overlap** cached frames for this mode to work correctly. When looping particles, make sure to export the particle **ID** channel in the Output rollout.

Software used: **Phoenix 4.41.02 Nightly from 2 Sept 2021, V-Ray 5 Update 1.1, Maya 2018**

Underwater Explosion

Scene (392 kB)

This scene demonstrates how to setup an underwater explosion using Phoenix. The scene uses two animated Liquid Sources in Volume Inject mode to get more interesting shape of the explosion. Each emitter has different geometry and animation for the Inject Power.

The Grid resolution is crucial for this setup. It controls the amount of particles emitted through the source and thus makes the explosion bigger or smaller. The scene scale is lowered to 0.5 to make the simulation a little bit faster in terms of speed for the water and the particles movement. The Foam and Splash particles are enabled in the Liquid Simulator.

In the Splash settings some of the particles are converted to Mist and the Foam on hit is set to 1 so that when the splashes collide with the liquid they will create foam.

In the Foam settings the rising and the falling speed of the foam contribute to foam movement and the large scale look of the explosion. To get a more interesting look for the foam the Foam Patterns are set to 0.4.

Additionally Phoenix Plain Force and a Turbulence Force are added to enhance the movement of the mist.

Software used: **Phoenix 5.01.00 Nightly from 23.08.2022, V-Ray 5 Update 2.2, Maya 2019**

Sink

Scene (2.3 MB)

This scene demonstrates how to set up a simple sink scene using Phoenix. There are two Liquid sources, one for the faucet and another one using negative Outgoing velocity in order to consume some liquid and prevent the sink from filling up. In order for the sink to be filled with some liquid at the start, a simple box is used with the Initial Fill option enabled in its Phoenix Properties. The steps per frame are set to 12 in order to compensate for the fast moving liquid particles.

Software used: **Phoenix 4.41.00, V-Ray 5 Update 1.1, Maya 2018**

Chocolate

Scene (127 kB)

This example shows how to simulate the process of covering a cookie with chocolate. The parameter that makes the liquid thick is the Viscosity. The bigger the viscosity, the thicker the liquid.

When simulating viscous liquids, enabling the Wetting and the Sticky Liquid is crucial. Otherwise, the liquid will not stick to objects. Another major point in this scene is the Mesh smoothing. It is very important to enable Liquid Particles for smoothing, because otherwise, the mesh may flicker during animation. In order to use particle-based smoothing, the liquid particles must be exported. You can check the Output rollout for more information.

Software used: **Phoenix 4.41.00, V-Ray 5 Update 1, Maya 2018**

Boiling Liquid using the Particle Tuner

Scene (105 MB)

This scene demonstrates how to setup boiling liquid with foam, where the foam size is based on the distance to a certain object using Phoenix. The scene uses dummy non-renderable geometry to fill the teapot with liquid at the start of the simulation using the Initial Liquid Fill option.

A Liquid Source in Volume Inject mode, using nParticles as an emitter is used to stir up the liquid and create the boiling effect.

The Foam particles are enabled in the Simulator. Then in the Output rollout of the Liquid Simulator the particle Velocity, ID, Age, RGB and Size channels for the Foam are enabled.

There are 5 Particle Tuners in the scene. The first two change the color of the foam particles based on their age. The third Particle Tuner takes the red foam particles that are inside of a text object and have an age of over two seconds and makes them bigger.

The fourth Particle Tuner makes all the foam particles outside of the text object smaller. Finally the fifth Particle Tuner sets the Velocity on the Z axis for the bigger foam particles to 0 - preventing them from bouncing up and down.

Software used: **Phoenix 4.40.00, V-Ray 5 hotfix 2, Maya 2018**

Shower

Scene (13.7 MB)

This scene demonstrates how to set up a simple shower scene using Phoenix. The shower nozzles are added to the Liquid source with some noise for the **Outgoing Velocity** in order to randomize the emission. The steps per frame are set to 10 in order to compensate for the fast moving liquid particles.

Software used: **Phoenix 3.12.00, V-Ray Next, Maya 2015**

Fountain

Scene (165 KB)

This scene demonstrates how to set up a simple fountain scene using Phoenix. There are four different sources with added noise for the **Outgoing velocity** in order to randomize the emission. The rendering of the Liquid simulator is disabled and the liquid particles are rendered as points using the **Phoenix Particle Shader**. For the ground material a **Phoenix Particle Texture** which uses the **Wetmap** particles is used as a mask to blend between a dry and wet material.

Software used: **Phoenix 3.11.00, V-Ray 3.60.04, Maya 2015**

Beach Waves

Scene (168 MB)

This scene demonstrates how to use the Phoenix Wave Force to create simulated waves on a shore. The simulated waves create Splash particles which in turn create Foam particles by using the **Foam On Hit** parameter of the Splash particles. Other important settings for the setup are the **Droplets Surfing** option which is enabled so that waves would slide upon the water surface instead of directly mixing with the water volume, and also the **Foam Patterns** which help create a more diverse surface of the foam left behind by the waves. The Foam **Rising Speed** is tuned to 35 cm/sec so the Foam remains underwater for a short while and can be tinted using the water material's fog color.

The Foam particles are rendered using the Phoenix Particle Shader in Point mode, which is the fastest particle render mode and is recommended for large scale scenes where individual bubbles are not visible and vast volumes of particles must be rendered. The settings are tuned in such a way that you can quickly switch to **Bubble** mode for the Foam and **Splash** mode for the Splash particles which are a bit more realistic but will take much longer to render. The Point **Shadow Strength** is boosted to 3.0 so the volume of the foam volume stands out and the foam is not rendered flat. The Point **Alpha** is lowered to 0.1 so individual foam particles don't pop up in the render as bright points, and only larger masses of foam are rendered more opaque. The **Volume Light Cache** of the Particle Shader is also enabled and uses a high **Light Cache Speedup** in order to improve the render times.

The liquid also creates WetMap particles over the shore geometry which are used to mask wet and dry materials using the Particle Texture. **Mesh Smoothing** is enabled in order to remove noise from the liquid mesh's surface, and the Mesh Smoothing **Particle Size** is increased so the mesh doesn't shrink and reveal air pockets between the liquid and the bottom which will become visible in the rendering. The preview of voxels and the Liquid and WetMap particles is switched off in order to speed up simulation and only the preview of Foam and Splash particles remains enabled. You may re-enable the preview if you want to observe the simulation process.

Software used: **Phoenix 3.12.00, V-Ray 3.60.04, Maya 2015**

Smoke and Fire Following a Path

Scene (35 KB)

This setup uses the Follow Path force in order to guide two separate simulations of smoke and fire along spline curves. The smoke simulator must exclude the fire simulator and the fire PhoenixPathFollow force. Also, the fire simulator must exclude the smoke simulator and its PhoenixPathFollow force. Thanks to this, the simulators won't interfere with each other and there won't be a specific order to simulate. Note: The Follow Path force can be used for liquids as well.

Car Tire Burnout

Scene (39 KB)

The tire is made **Solid**. Another cylindrical geometry object is created around the tire in order to drag the smoke around it. The surrounding body is made **non-Solid** and non-renderable. It is connected to a PHXSource and everything on the source is turned off except for **Motion Velocity** so that the body affects the smoke's velocity when spinning. The surrounding body must be connected to the wheel and spin together with it. The Simulator's Object voxels are set to **Inscribed** so that the smoke would enter the real renderable wheel's volume a bit, otherwise, there would be a visible gap between the smoke and the tire. You can control how much the smoke is dragged by the wheel using the Motion Velocity multiplier on the source.

A non-Solid, non-renderable box is placed at the contact patch between the wheel and the ground. It is connected to a second PHXSource and the source is set in **Inject** mode as it discharges smoke with added pressure.

The scene uses classic **Vorticity** for this one. **PCG** Symmetric conservation is used as it is more detailed than Smooth. The **Conservation Quality** is set to *20* so the smoke rolls better. Simulation steps are set to *2 - 1* step is not enough and the smoke starts becoming grainy due to the high velocity, but more than 2 starts to smooth out the smoke a bit too much.

Lava Lamp

Scene (486 KB)

Three forces are used in the scene. Two BodyForce helpers on the top and bottom of the lamp to give the fluid its vertical motion, and a Turbulence field that adds chaotic changes in the velocity field to break the bubbles apart.
The BodyForce helpers are set up such that each one affects only half the lamp. The bottom one pushes the liquid upwards, and the top one pushes it back down. After a while, the fluid loses its momentum and the system reaches equilibrium. To avoid this, a weak turbulence has been added that prevents the system from balancing and introduces additional fluid splitting forces.
A polygon grid has been added at the bottom of the lamp to help the fluid collect there, just like it does in real Lava Lamps.
The Liquid Source is in Volume Brush Emit Mode, connected to a Sphere. The "Non-Solid" option is enabled on the Sphere for the Volume Brush mode to work.
The discharge parameter is animated - if you'd rather have more/less liquid in the lamp, you can simply move the key along the timeline or input a different value for this parameter.
Play Speed is set to 0.4 to slow down the playback of the simulation.
You can play with the Random Seed value on the Turbulence node to get different looking simulations with little effort.

Morphing Liquid with Body Force

Scene (1 MB)

This scene shows how to shape a liquid into a geometry volume using the Body Force component.

Both Solid and non-solid modes are supported. When the object is solid, the liquid will be pushed to its surface. When the object is non-solid, the liquid would fill the object. This scene uses non-solid objects which are made non-renderable and their volume is filled. The strength of each force is animated in order to produce the morphing. The forces are activated sequentially and the liquid takes the shape of the currently active force.

Fireplace

Scene (205 kB)

This scene demonstrates how to set up a Fireplace simulation.

For this scene, the Conservation Method is set to Buffered as it produces the best detail for fire simulations. The Steps per Frame option is set to 5 because of the fast motion of the flames. A noise texture is used for the Outgoing Velocity and Temperature slots of the Source so that the fire emission is distributed randomly along the logs' surface which adds more diversity.
For rendering, the Fire opacity mode is set to Use Own Opacity and the render curve is adjusted to bring out the detail of the fire. The Fire opacity is multiplied by a V-Ray Distance texture in order to make the fire transparent near the logs.

Software used: **Phoenix 4.40.00, V-Ray 5 hotfix 2, Maya 2018**

Ink in Water

Scene (18 KB)

This example demonstrates a technique for rendering thin smoke layers, ink in water, etc. The technique is particle-based and uses the Points Mode of the Particle Shader. The sources are set to Volume Inject emit mode and a noise map is used as a discharge map for creating this two-colored emitter. The particle shaders are being used for setting the geometry mode to points with a very small size to give a smoother look to the fluid and point color. A high value for the Light Cache Speedup option will help create quicker renders.

Nuke

Scene (18 KB)

This scene demonstrates how to create a highly symmetrical nuclear mushroom cloud. The setup contains a spherical emitter and source in **Volume Inject** emit mode connected to it which creates the fireball. The ground also has a source connected to it emitting for a couple of frames creating a "dusty" effect. The scene uses **PCG Symmetric** conservation with high quality in order to produce the rolling of the vortex ring that forms from the fireball, and **Massive Vorticity** is used in order to give more detail to the smoke.

Smoke Vortex

Scene (18 KB)

The content of the simulator is initialized using a box geometry with attached source to it. The source discharge mode is **Volume brush** which fills the whole volume inside. The geometry is not renderable and it has been made **non-solid** from Extra Phoenix attributes rollout menu. Then a vortex is created inside the fluid using a **Maya Vortex** field. Additionally, a sphere geometry object with a negative discharge is used, which pulls the smoke inside creating a hole in the middle of the vortex.