phoenix
fluid dynamics

Features List

Phoenix FD is a powerful tool for fluid simulations. Aimed to meet the needs of VFX artists to simulate fire, smoke, explosions as well as liquids, foam and splashes, Phoenix FD has now become universal simulation software for every production house.

RENDERING

Displacement

One of the most powerful features of Phoenix FD is fluid displacement, which provides a completely new way for adding fine details to the visualized fluid. As in the usual geometry displacement, the displaced fluid is moved along the normal with a certain value given by a texture. The fine details of the texture can be much smaller than the grid's cell and this leads to a totally new appearance of the rendered result. The Phoenix FD displacement technique does not use a copy of the fluid with bigger resolution, which leads to a great memory efficiency. Furthermore, the displacement algorithm is fully multi threaded.

Proper blending (requires V-Ray)

A well-known issue of atmospheric objects is the inability to properly blend two or more overlapped atmospheres. Phoenix FD is capable of completely solving that issue and to properly blend all its atmospheric effects including the foam.

Heat haze (requires V-Ray)

In this mode, the rays traced inside the simulator's volume are redirected based on the content gradient. All scalar channels can be used as a heat haze source.

Solid mode (requires V-Ray)

In this mode, the content is rendered as a procedural geometry object with surface determined by the threshold value of the selected channel. By using this mode, the user can simulate and render realistically looking liquids in a few minutes.

Proper GI support with V-Ray

Global illumination plays an important role in the visualization of smoke effects. Phoenix FD supports all of V-Ray's GI features and adds some accelerating options to avoid the local scattering.

Shader memory efficiency

The architecture of the volumetric shader has been reorganized to consume less memory. The memory efficiency increased about twice for atmospheric mode and eight times for solid mode.

Geometry gizmo for both modes of rendering

Additional control over rendering has been given through the introduction of gizmos. Phoenix FD can now use any arbitrary geometry as a gizmo, and render only parts of the simulation that are inside (or outside) of the specified gizmo. This allows the user to render the desired results much easier.

Foam and splashes particle shader

Phoenix FD 2.0 comes with a brand new shader for particles. It allows the user to have full control when shading foam and splashes particles generated by the new core.

Render particles as smoke

New and improved shading methods allow the rendering of small tightly packed particles as a volumetric smoke. This simple yet powerful solution allows the user to add plenty of detail to their simulations without sacrificing render times.

SIMULATION

Fast physically based simulation core

A unique approach towards internal optimizations was adopted when developing the Phoenix FD simulation core. It allows for reduced calculation times while keeping the whole simulation physically accurate and enables the user to simulate some additional processes such as pressure decay, thermal radiation cooling and mass-temperature relation.

Background simulation

The simulation process of Phoenix FD runs independently and does not lock the UI of 3ds Max. This allows the user to make changes in the simulation, and even to perform rendering. Furthermore, changes to the simulator parameters immediately affect the simulation.

Support for all standard space warp modifiers

Phoenix FD supports all 3ds Max standard space warp modifiers which allows to easily affect the movement of the fluid.

Wind from movement

This feature allows the user to simulate moving fluid objects (like torches, flying fireballs, etc.) without the use of fake additional winds. Both linear and angular winds are simulated.

Fluid source form pre-simulated surface

Using the effects channel of a Phoenix FD object the user can define an implicit surface and use it as a fluid source for another Phoenix FD object. This allows the creation of effects like burning liquids, water releasing vapor, etc.

Particle-based sources

Using geometry sources is not always suitable, especially when the fluid should appear "out of nothing". For such situations a particle system can be used as a source and all parameters can be animated in particle age time.

MaxScript support

Phoenix FD exports a number of MaxScript functions which give direct access to the simulator's content and the simulation result. Using the script mechanism, the user can obtain results that are impossible or very hard to achieve with conventional methods. For example one can set some complicated initial conditions of the simulation, build their own procedural sources and volumetric textures, etc.

Extension for liquid simulations

With the new version of Phoenix, the user is now fully equipped to create stunning simulations of liquids.

Turbulence helper

Using the new turbulence helper, you can have much more control when adding random turbulence to your simulation.

Analytic scattering mode

A new analytical mode allows the scattering of light into the fluid with greater efficiency and speed.

Support of Thinking Particles systems as sources

Phoenix now fully supports Thinking Particle systems that you can use as sources in your simulations.

Improved multithreading of the simulation

Internal optimizations now allow the simulation to be multithreaded more efficiently.

Particle export

In Phoenix 2.0, the simulation core has been further improved to be able to efficiently trace particles. This allows the user to add even finer detail to all types of simulations without the need to increase the simulation resolution.

Simulation of foam and splashes

With the new and improved simulation core, Phoenix FD is capable of generating particles where foam or splashes would usually appear in a simulation. This extraordinary new technology allows the user to further increase the realism of liquid simulations.

ADDITIONAL FUNCTIONALITIES

GPU accelerated preview

Setting up the rendering of flames and other emissive effects can be greatly accelerated with the help of the GPU preview function. It allows the user to fine-tune the look of the final render since the preview matches it completely. In version 2.0 the GPU preview fully supports lighting and diffuse color shading. Additionally, the renderings can be automatically saved as PNG files in the simulation directory. This seemingly simple upgrade will allow the user to quickly preview their simulation results without having to waste time rendering them on the CPU.

ParticleFlow operators

With the Phoenix FD ParticleFlow operators the user can move the particles along the fluid or change their events, which allows for a large variety of particle-based effects.

Procedural texture export

The Phoenix FD plugin comes with an additional 3D texture which allows the simulation result to be rendered with any general purpose volumetric shader like VrayEnvironmentFog. In addition to external shading, the texture export allows the creation of many special effects, for example lava-looking surface achieved with displaced transparency channel and non-displaced emissive channel etc.

Particle texture tool

Using this tool, the user can generate a displacement texture based on particles dragged by the fluid, achieving fine details moved along the fluid. Technically the texture is not specifically related to other Phoenix FD objects and can be used independently.

Playback time scale

Using a special blending algorithm, Phoenix FD is able to construct intermediate frames and to play the simulation result with variable speed.