10.2.2.4.5 Render - Blender Render Engine - Textures - Texture types - Volume Textures

Volume Textures

Blender has two textures that can be applied to volumetric data:

Voxel Data
: Voxel data renders a voxel source. It can be used for rendering Blender's internal smoke simulations. Other sources include binary raw formats, and Image Sequence, which can be used to stack a sequence of images into a 3D representation

Point Density
: Point density renders a given point cloud (object vertices or particle system) as a 3D volume

- Voxel Data
- Point Density Texture

Voxel Data

Voxel data renders a voxel source, working very similarly to an image texture, but in 3d. Various input data source types are available (such as smoke voxel data, or external files), as well as various interpolation methods.

The voxels are stored in a flat z/y/x grid of floats. Functions for sampling this based on location within the (0,1) bounds are available in:

- source/blender/blenlib/intern/voxel.c

The default voxel data source, Smoke, is used for rendering Blender's internal smoke simulations. Other sources include binary raw formats, and Image Sequence, which can be used to stack a sequence of images into a 3D representation, which is a common format for medical volume data such as CT scans.

Settings

File Format
: **Blender Voxel**
  Default binary voxel file format.
  8 bit RAW
  8 bit grayscale binary data.
  Image Sequence

Generate voxels from a sequence of image slices.

Smoke
Render voxels from a Blender smoke simulation.

Source Path
The external source data file to use for 8 bit Raw data and Blender Voxel formats

Domain Object (Smoke)
Object used as the smoke simulation domain

Source

Smoke
Use smoke density and color as texture data.

Flame
Use flame temperature as texture data.

Heat
Use smoke heat as texture data. Values from -2.0 to 2.0 are used.

Velocity
Use smoke velocity as texture data.

Resolution
Resolution of the voxel grid when using 8 bit Raw data.

Interpolation

Nearest Neighbor
No interpolation, fast but blocky and low quality.

Linear
Good smoothness and speed.

Quadratic
Mid-range quality and speed.

Cubic Catmull-Rom
Smoothed high quality interpolation, but slower.

Extension

Extend
Extend by repeating edge pixels of the image.

Clip
Clip to image size and set exterior pixels as transparent.

Repeat
Cause the image to repeat horizontally and vertically.

Intensity
Multiplier for intensity values

Point Density Texture

Point density renders a given point cloud (object vertices or particle system) as a 3D volume, using a user-defined radius for the points. Internally, the system uses a BVH data structure for fast range lookups.

The rendered points are spherical by default, with various smooth falloff options, as well as simple Turbulence options for displacing the result with noise, adding fine detail. When using Point Density with a particle system, additional particle info such as particle velocity, age, and speed, can be visualized using a color/alpha ramp gradient.

Options

Particle System
Particle System, Generate point density from a particle system.
Object Vertices
Object Vertices, Generate point density from an object’s vertices.

Object Radius System Falloff

Standard Smooth Soft Softness

Constant

Density is constant within lookup radius.

Root Particle Age Particle Velocity Velocity Scale

Falloff Curve
Use a custom falloff
Cache
Coordinate system to cache particles in Global Space Emit Object Space Emit Object Location
Color Source

Data to derive the color results from

Constant
Constant color
Particle Age
Lifetime mapped as 0.0 - 1.0 intensity.
Particle Speed

Particle speed (absolute magnitude of velocity) mapped as 0.0-1.0 intensity.

Scale
Multiplier to bring particle speed within an acceptable range.
Particle Velocity

XYZ velocity mapped to RGB colors.

Scale
Multiplier to bring particle speed within an acceptable range.

Turbulence

Adds directed noise to the density at render time

Influence

Method for driving added turbulent noise

Static
Noise patterns will remain unchanged, faster and suitable for stills.
Particle Velocity
Turbulent noise driven by particle velocity.

Particle Age
Turbulent noise driven by the particle’s age between birth and death.
Global Time
Turbulent noise driven by the global current frame.

Noise Basis
See *Here*

Size
Scale of the turbulent noise

Depth
Level of detail in the added turbulent noise

Turbulence Strength
Strength of the added turbulent noise