Materials and Shaders

Overview

3Delight for Maya can render any *Maya HyperShade* network. Scenes that are setup using the usual *Maya* workflow will work out-of-the-box with *3Delight for Maya*. On top of that, *3Delight for Maya* provides additional utility nodes and additional materials for physically plausible shading.

Content:

3Delight's Materials and Shaders Library

In addition to standard *Maya* nodes and materials, *3Delight for Maya* comes with easy to use and physically plausible materials.

3Delight Material – A hightly versatile dual-layer material to simulate a large variety of surfaces.
3Delight Skin – For rendering (human) skin.
3Delight Glass – For rendering glass.
3Delight Hair – For rendering realistic hair.
3Delight Metal – For rendering physically correct metallic materials.
3Delight Sky – For rendering physically correct sky dome.
3Delight Primitive Attribute – A utility to read & output primitive attributes into a shading network.

In addition to these materials, we provide a utility node that allows you to inject *RenderMan Shading Language (RSL)* code into *HyperShade* network. We call that utility node The RenderMan Code Node and a tutorial for creating such node is available in Creating Custom HyperShade Nodes.

Supported *Maya* and *Mental Ray* shaders

All the common *Maya* nodes are supported and a large set of useful *Mental Ray* materials is also supported. All *Maya* light sources are supported as well.

Follows is a list of all these supported nodes, in alphabetical order.

3Delight for Maya support *Maya*'s *HyperShade* network; it automatically converts (at the start of the rendering process) *HyperShade* networks into *RenderMan* shaders that are used by *3Delight* to render the image.

Supported Standard *Maya* Shader Nodes					
addDoubleLinear	anisotropic	blendColors	blinn	brownian	bulge
bump2d	bump3d	checker	clearCoat	cloth	cloud
condition	contrast	directionalLight	displacementShader	distanceBetween	doubleShadingSwitch
envChrome	envCube	envSphere	file	fluidShape	fluid_utils
fractal	gammaCorrect	global_illumination	granite	grid	hsvToRgb
lambert	layeredShader	layeredTexture	leather	lightInfo	light_utils
luminance	marble	mi_bump_flakes	mi_car_paint_phen	mi_metallic_paint	mia_material
mia_material_x	mia_material_x_passes	mia_physicalsky	mib_amb_occlusion	mib_glossy_reflection	mib_glossy_refraction
mib_illum_cooktorr	mib_illum_lambert	mib_illum_phong	misss_fast_shader	misss_fast_simple_maya	misss_fast_skin_maya
misss_set_normal	misss_skin_specular	multDoubleLinear	multiplyDivide	noise	noise_utils
ocean	oceanShader	ocean_utils	particleCloud	particleSamplerInfo	phong
phongE	place2dTexture	place3dTexture	plusMinusAverage	pointLight	projection
psdFileTex	quadShadingSwitch	ramp	rampShader	ramp_utils	remapColor
remapHsv	remapValue	reverse	rgbToHsv	rock	samplerInfo
setRange	shadingMap	shading_utils	singleShadingSwitch	smear	snow
solidFractal	spotLight	stencil	stucco	studioClearCoat	surfaceLuminance

surfaceShader	texture3d	tripleShadingSwitch	useBackground	utils	uvChooser
vectorProduct	volumeLight	volumeNoise	wood		

About Physical Plausibility

"Physically plausible" terminology has been introduced in the computer graphics literature to described a certain category of BRDFs [1]. In technical terms, a physically plausible BRDF:

1. Is energy conservative (e.g. doesn't emit energy that it doesn't receive).
2. Is reciprocal (respects the Helmholtz reciprocity principle).
3. Doesn't return negative values (this last point is not always mentioned in literature).

In simpler terms, it just means that the BRDF acts as a real life surface would act.

The expression "physically plausible material" is used in the VFX industry, somewhat loosely, to indicate that the material is based on such BRDFs. In reality, it is very difficult to design materials that are physically plausible since many useful BRDFs are not even energy conservative [2]. So it is often more accurate to talk about *visually plausible materials*.

Physical Plausibility vs. Realism

It's possible to design physically a plausible BRDF, respecting the three rules sited above, but still produce images that do not render real life phenomena. In a sense, physical plausibility is not a guarantee of a realistic material.

Realism in look development is achieved by a mix of sound science, intelligent parameter design and a clear understanding of what is being simulated. As an example, many available materials provide a choice of BRDFs and an extended choice of parameters. These materials are not suited to render some of the most common real-life objects such as a table or a car. These types of materials are usually coated and it takes a two-layer material and special care to properly render them. Our 3Delight Material provides this possibility.

[1] Robert R. Lewis. 1993. *Making Shaders More Physically Plausible*. Technical Report. University of British Columbia, Vancouver, BC, Canada, Canada.

[2] This is the case because many of the BRDFs rely on lobe-shaped distributions that could go under the horizon for grazing view angles. Most implementation simply ignore this limitation — but strictly speaking, this is an energy conservation problem.