

Experimental Analysis of BRDF Models - Supplemental

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This document is supplemental to the paper titled *Experimental Analysis of BRDF Models*, published at Eurographics Symposium on Rendering 2005. In the following section we list the equations for the BRDF models employed in our isotropic analysis. The rest of the document contains complete fitting results for the 100 isotropic materials, together with BRDF plots in the incidence plane, and sample images. For further information, please refer to the original paper, and our project webpage at <http://groups.csail.mit.edu/graphics/brdf>.

BRDF Models

The formulations of the 7 models we use in our analysis are listed below. We enforce the diffuse contribution to Lambertian and omit the diffuse terms in the listing. The correspondences between the model parameters and our indexed parameters are shown next to the name of each model.

Common Notations	
N	normal
$V, (v_x, v_y, v_z)$	outgoing vector (view)
$L, (l_x, l_y, l_z)$	incoming vector (light)
R	mirror reflection of L
H	half vector
δ	angle between N and H

- Ward [$p_0 = \alpha$]

$$K = \rho_s \cdot \frac{1}{\sqrt{(N \cdot L)(N \cdot V)}} \cdot \frac{\exp[-\tan^2 \delta / \alpha^2]}{4\pi\alpha^2}$$

- Ward-Duer [$p_0 = \alpha$]

$$K = \rho_s \cdot \frac{1}{(N \cdot L)(N \cdot V)} \cdot \frac{\exp[-\tan^2 \delta / \alpha^2]}{4\pi\alpha^2}$$

- Blinn-Phong [$p_0 = n$]

$$K = \rho_s \cdot \frac{n+2}{2\pi} \cos^n \delta$$

- Lafortune et al. [$p_0 = C_{xy}, p_1 = C_z, p_2 = n$]

$$K = \rho_s \cdot [C_{xy}(l_x v_x + l_y v_y) + C_z l_z v_z]^n \cdot \frac{n+2}{2\pi[\max(|C_z|, |C_{xy}|)]^n}$$

where the last term is added to provide an approximate normalization.

- Cook-Torrance [$p_0 = F_0, p_1 = m$]

$$K = \frac{\rho_s}{\pi} \frac{DG}{(N \cdot L)(N \cdot V)} \text{Fresnel}(F_0, V \cdot H)$$

where $G = \min\{1, \frac{2(N \cdot H)(N \cdot V)}{(V \cdot H)}, \frac{2(N \cdot H)(N \cdot L)}{(V \cdot H)}\}$ and $D = \frac{1}{m^2 \cos^4 \delta} e^{-[(\tan \delta)/m]^2}$

- Ashikhmin-Shirley [$p_0 = F_0, p_1 = n$]

$$K = \frac{n+1}{8\pi} \frac{(N \cdot H)^n}{(V \cdot H) \max((N \cdot L), (N \cdot V))} \text{Fresnel}(F_0, V \cdot H)$$

- He et al. [$p_0 = \tau, p_1 = \sigma, p_2 = n$]

Please refer to the original paper for the full formulation. The expression τ is the auto-correlation length, σ is the standard deviation of surface height, and n is the refractive index. We employ the unpolarized version of the model, and the ideal specular term is omitted.

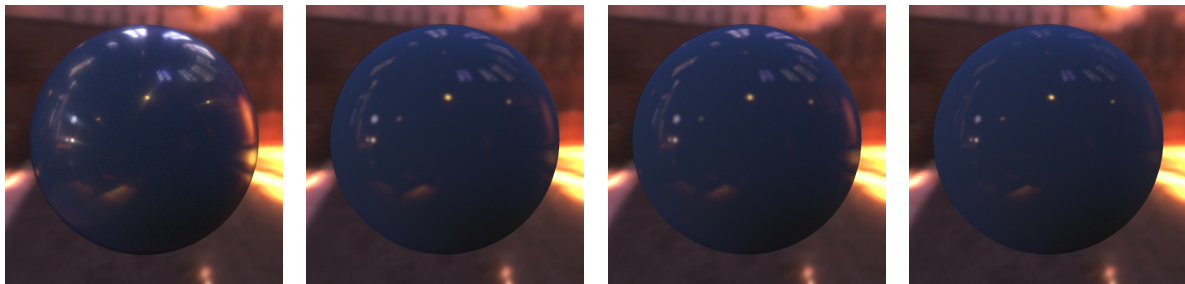
Complete Fitting Results

Material Name: acrylic-blue

Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.0138	0.0326	0.0636	0.00774	0.00547	0.00339	0.0162			0.0194
Ward-Duer	0.0137	0.0326	0.0637	0.00534	0.00364	0.00224	0.0162			0.0165
Blinn-Phong	0.0147	0.0332	0.064	0.0016	0.00115	0.000709	1.37e+004			0.0222
Lafortune et al.	0.0145	0.0332	0.064	0.0238	0.0164	0.01	-0.577	0.577	4.06e+003	0.0167
Cook-Torrance	0.0143	0.033	0.0639	0.0291	0.0193	0.0118	0.117	0.0137		0.0155
He et al.	0.0147	0.0334	0.0641	2.93	1.92	1.17	28.7	0.063	1.08	0.0141
Ashikhmin-Shirley	0.0143	0.0331	0.0639	0.0366	0.0241	0.0147	0.0949	1.16e+004		0.0153

Rendered Images

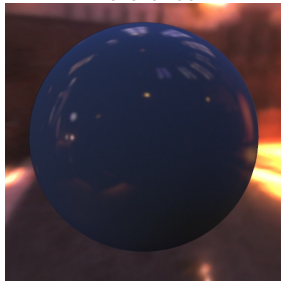


Reference

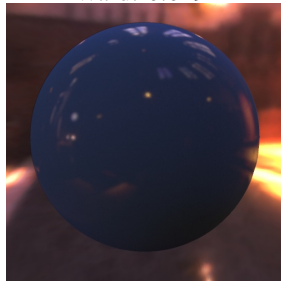
Ward: 0.0194

Ward-Duer: 0.0165

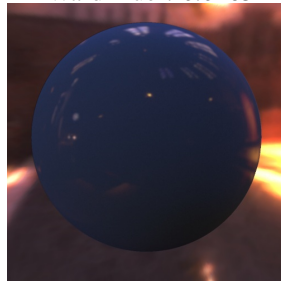
BP: 0.0222



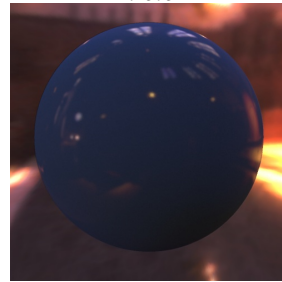
Lafortune: 0.0167



CT: 0.0155

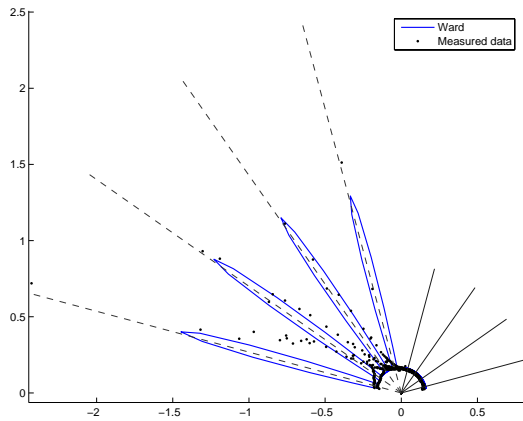


He: 0.0141

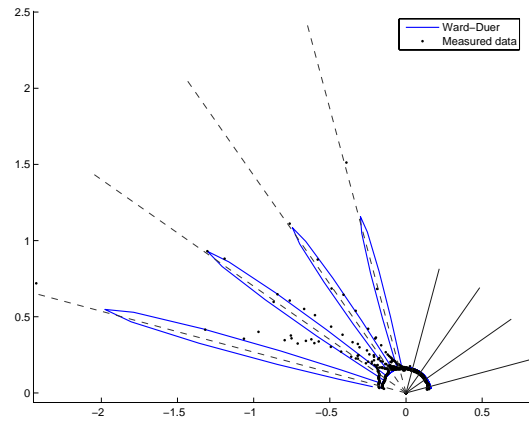


Ash: 0.0153

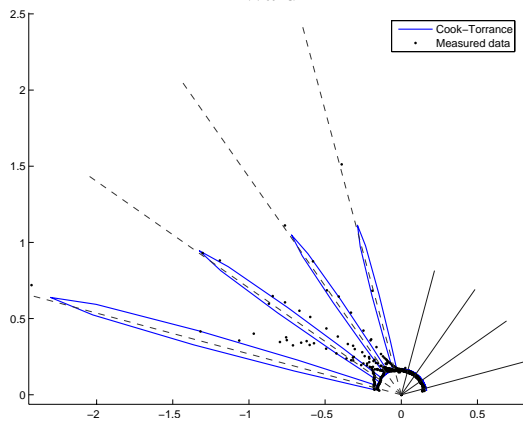
BRDF Plots in the incidence plane (Cubic root applied)



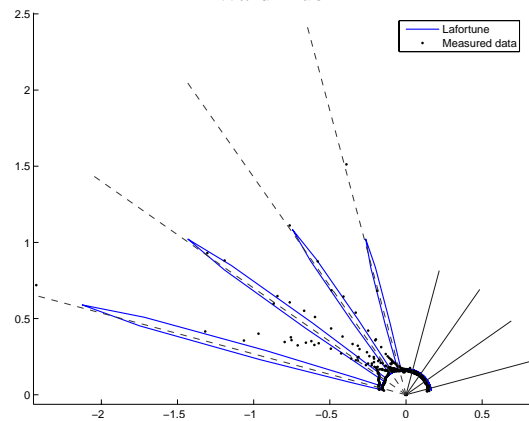
Ward



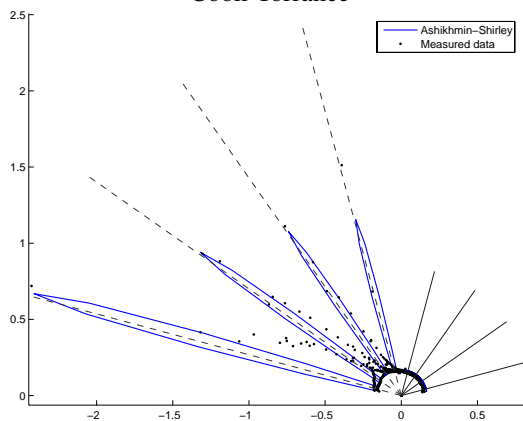
Ward-Duer



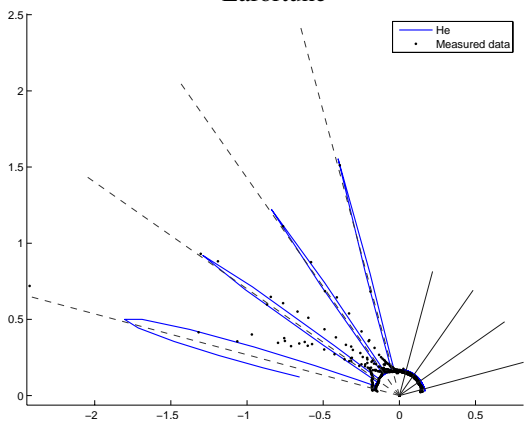
Cook-Torrance



Lafortune



Ashikhmin-Shirley



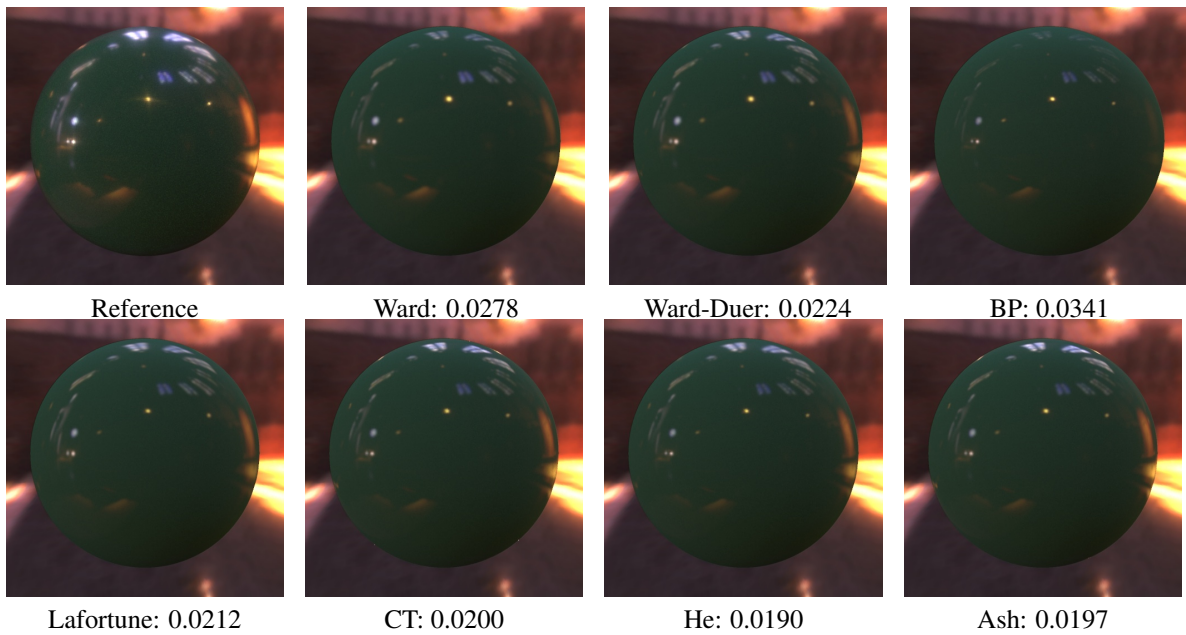
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Material Name: acrylic-green

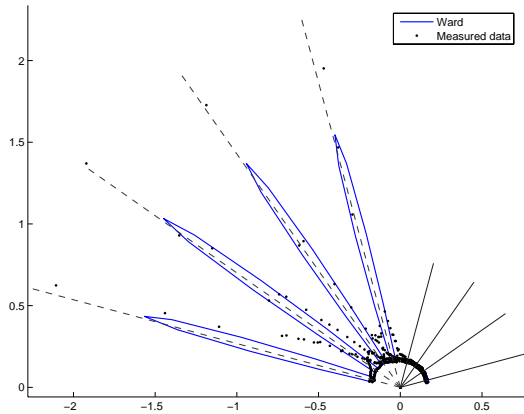
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.0164	0.0641	0.0238	0.0101	0.00793	0.00495	0.0141			0.0278
Ward-Duer	0.0165	0.064	0.0239	0.0068	0.00548	0.00335	0.0137			0.0224
Blinn-Phong	0.0183	0.0657	0.0248	0.00161	0.00121	0.000781	2.84e+004			0.0341
Lafortune et al.	0.0175	0.0648	0.0244	0.0327	0.0263	0.0158	-0.577	0.577	5.08e+003	0.0212
Cook-Torrance	0.0173	0.0646	0.0243	0.0477	0.0386	0.0233	0.0832	0.0111		0.02
He et al.	0.0173	0.0646	0.0242	0.449	0.364	0.222	28	0.119	1.21	0.019
Ashikhmin-Shirley	0.0174	0.0647	0.0243	0.0639	0.0518	0.0313	0.0659	1.74e+004		0.0197

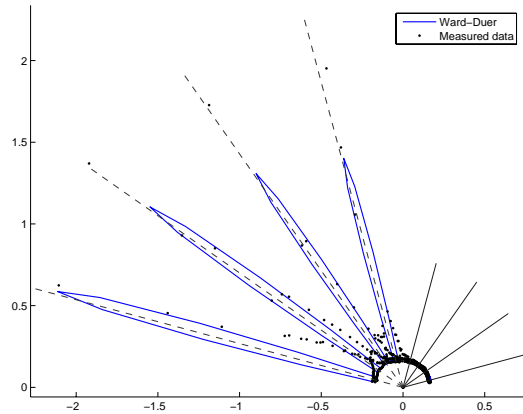
Rendered Images



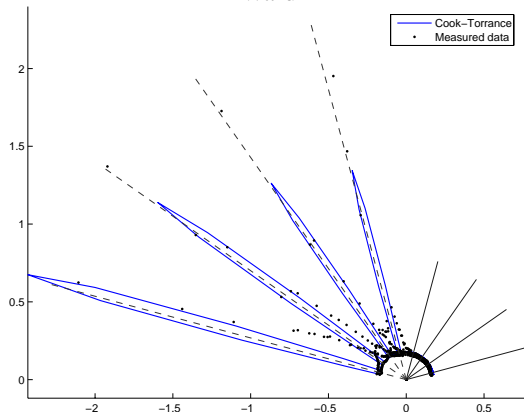
BRDF Plots in the incidence plane (Cubic root applied)



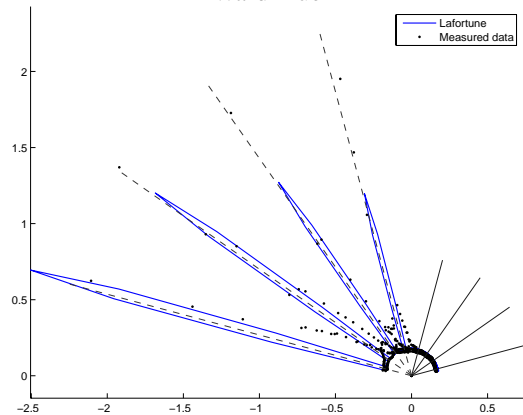
Ward



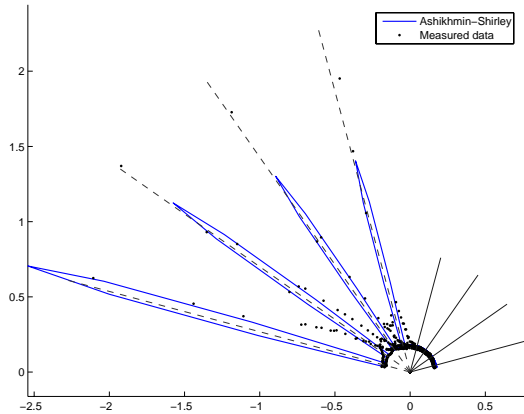
Ward-Duer



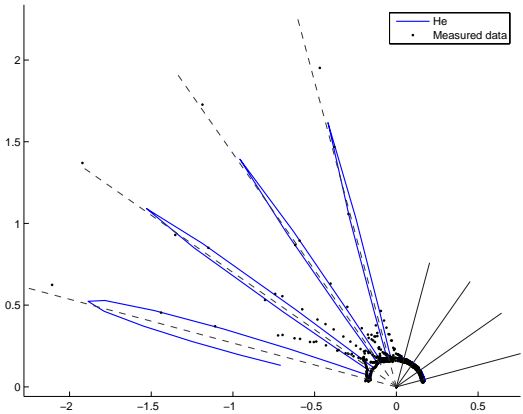
Cook-Torrance



Lafortune



Ashikhmin-Shirley



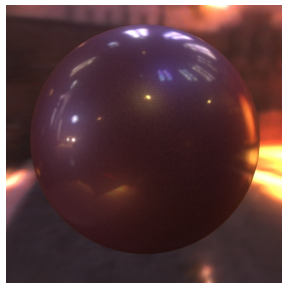
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Material Name: acrylic-violet

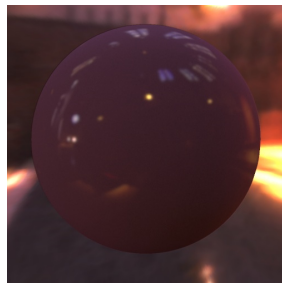
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.0681	0.0242	0.0287	0.0105	0.00713	0.00448	0.0142			0.0346
Ward-Duer	0.0678	0.0239	0.0285	0.00809	0.00558	0.00346	0.0157			0.0302
Blinn-Phong	0.0712	0.0263	0.03	0.000956	0.000608	0.000389	6.76e+004			0.0409
Lafortune et al.	0.0693	0.025	0.0292	0.032	0.0221	0.0133	-0.577	0.577	5.84e+003	0.0292
Cook-Torrance	0.0689	0.0246	0.029	0.0578	0.0404	0.0246	0.0726	0.0129		0.0274
He et al.	0.0692	0.0249	0.0291	22.4	15.3	9.38	28.2	0.0335	1.06	0.024
Ashikhmin-Shirley	0.069	0.0246	0.029	0.0756	0.0533	0.0323	0.0586	1.37e+004		0.0264

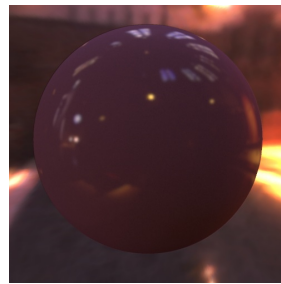
Rendered Images



Reference



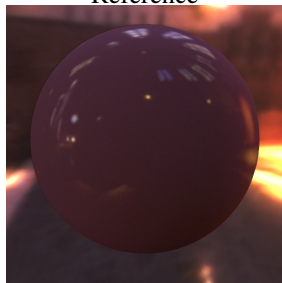
Ward: 0.0346



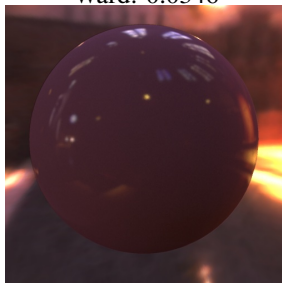
Ward-Duer: 0.0302



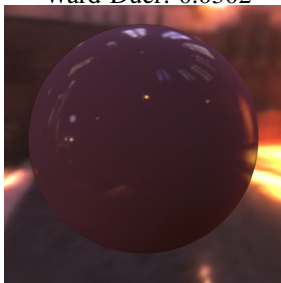
BP: 0.0409



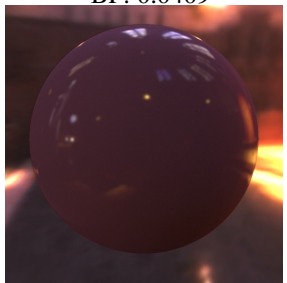
Lafortune: 0.0292



CT: 0.0274

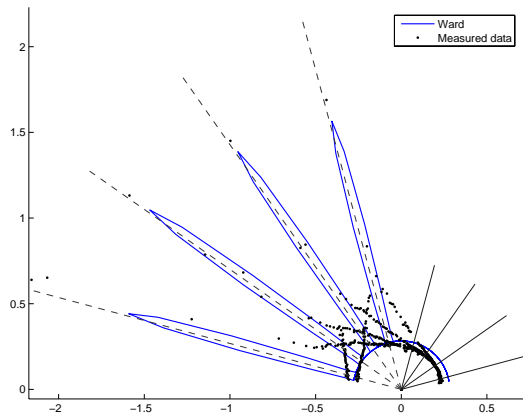


He: 0.0240

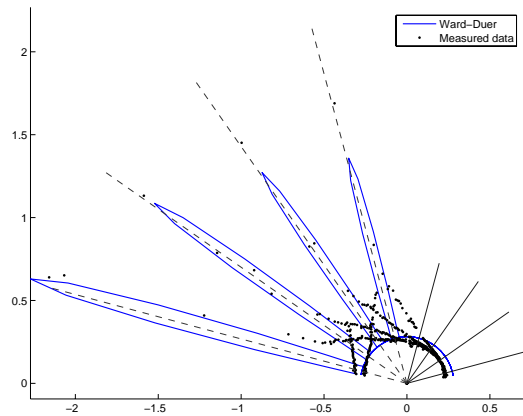


Ash: 0.0264

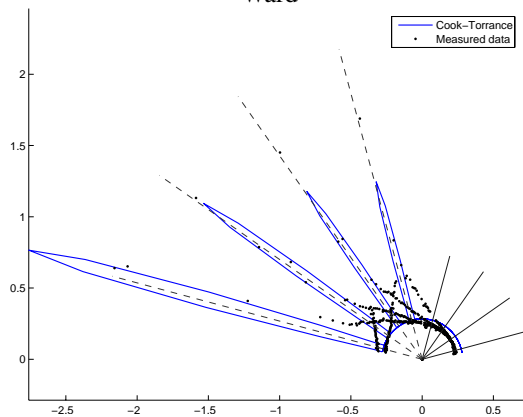
BRDF Plots in the incidence plane (Cubic root applied)



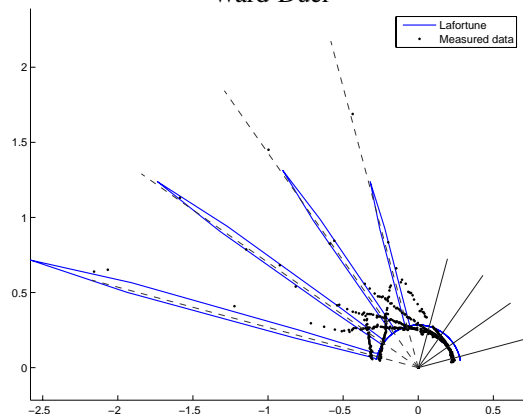
Ward



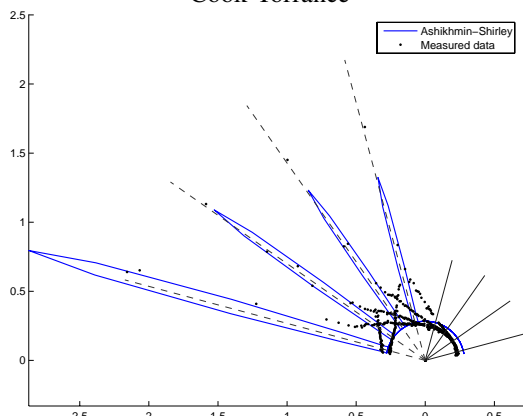
Ward-Duer



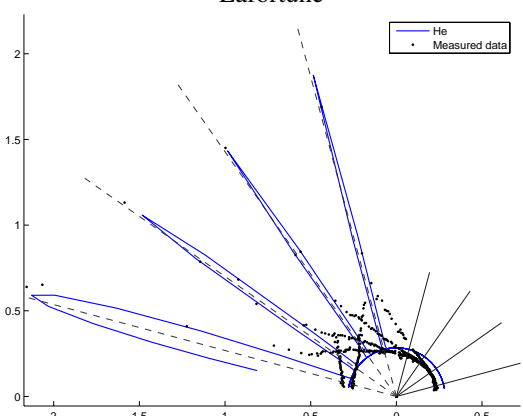
Cook-Torrance



Lafortune



Ashikhmin-Shirley



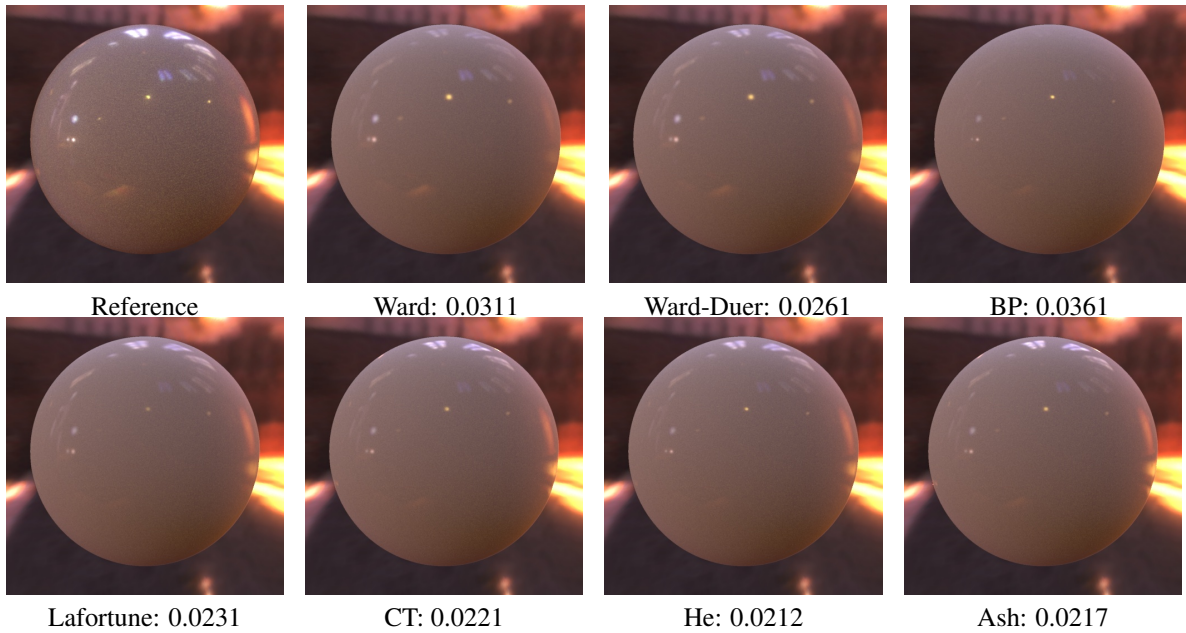
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Material Name: acrylic-white

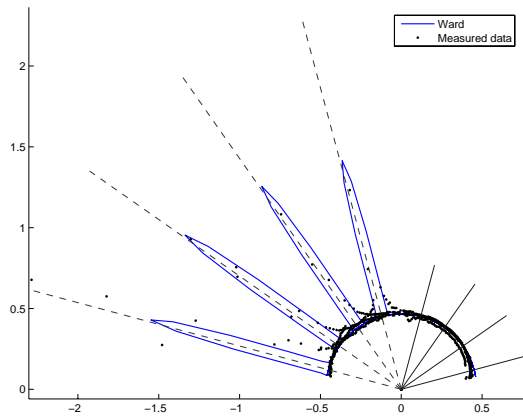
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.312	0.257	0.155	0.00928	0.00669	0.00447	0.0158			0.0311
Ward-Duer	0.312	0.257	0.155	0.00673	0.00478	0.00318	0.0155			0.0261
Blinn-Phong	0.314	0.259	0.156	0.00103	0.000739	0.000481	3.56e+004			0.0361
Lafortune et al.	0.313	0.258	0.155	0.0581	0.0409	0.0264	-0.578	0.577	3.98e+003	0.0231
Cook-Torrance	0.313	0.258	0.155	0.0722	0.0506	0.0326	0.0368	0.0119		0.0221
He et al.	0.313	0.258	0.155	1.87	1.31	0.839	28	0.0984	1.08	0.0212
Ashikhmin-Shirley	0.313	0.258	0.155	0.0843	0.0588	0.0376	0.0374	1.53e+004		0.0217

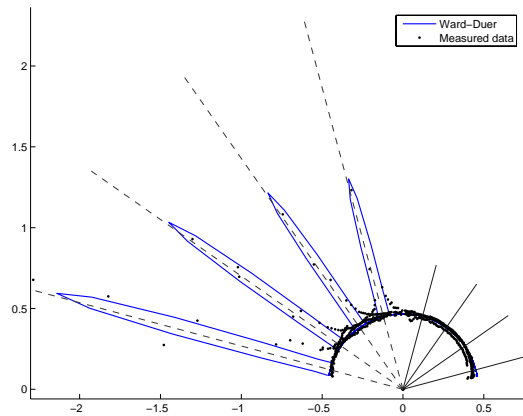
Rendered Images



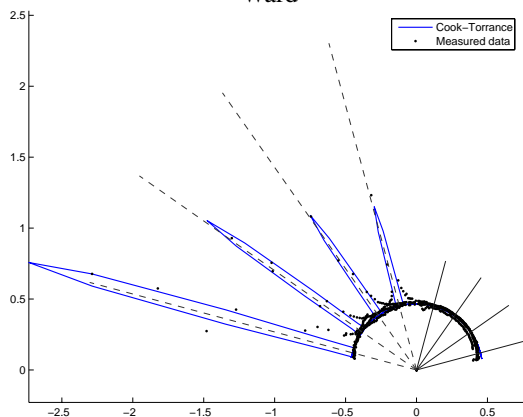
BRDF Plots in the incidence plane (Cubic root applied)



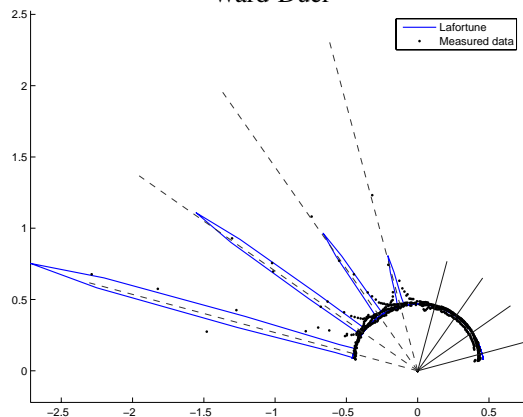
Ward



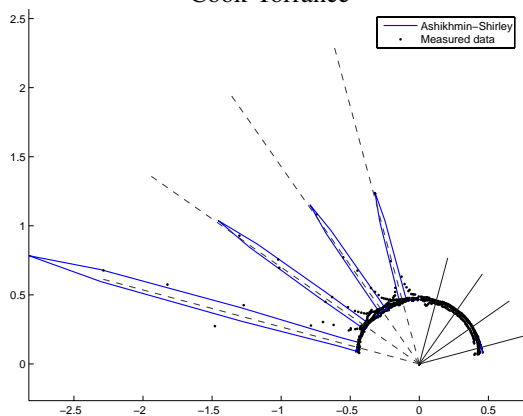
Ward-Duer



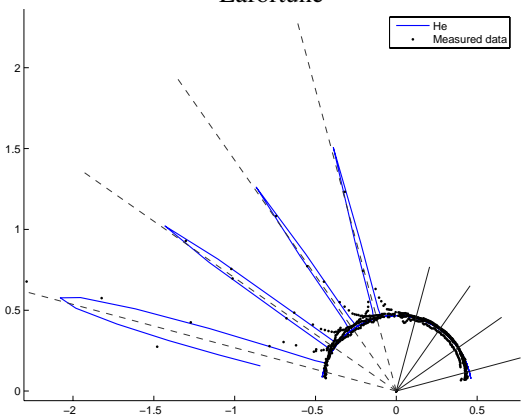
Cook-Torrance



Lafortune



Ashikhmin-Shirley



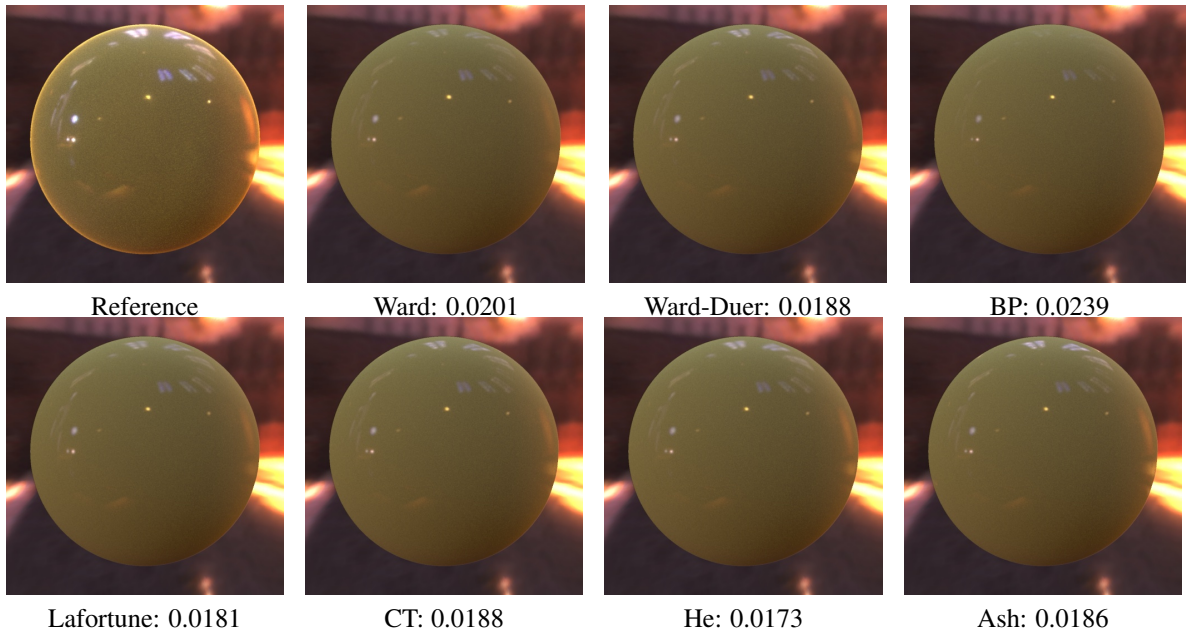
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Material Name: acrylic-yellow

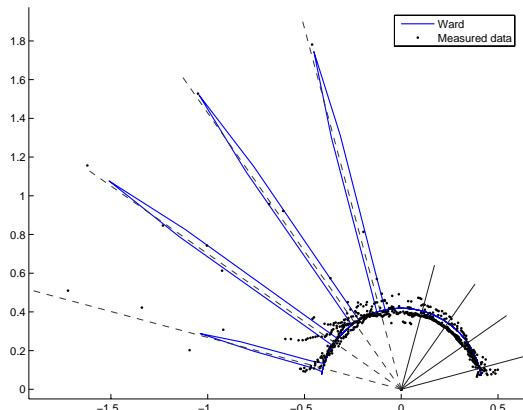
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.225	0.233	0.0489	0.00619	0.0044	0.00301	0.00923			0.0201
Ward-Duer	0.225	0.233	0.0489	0.0043	0.00302	0.00213	0.00883			0.0188
Blinn-Phong	0.226	0.233	0.0494	0.00135	0.000975	0.000641	4.08e+004			0.0239
Lafortune et al.	0.225	0.233	0.0489	0.0121	0.00852	0.00599	-0.577	0.577	7.28e+003	0.0181
Cook-Torrance	0.225	0.233	0.0489	0.0109	0.00764	0.00539	0.399	0.00882		0.0188
He et al.	0.225	0.233	0.0488	0.187	0.133	0.0915	28	0.107	1.4	0.0173
Ashikhmin-Shirley	0.225	0.233	0.049	0.0241	0.0168	0.012	0.162	2.84e+004		0.0186

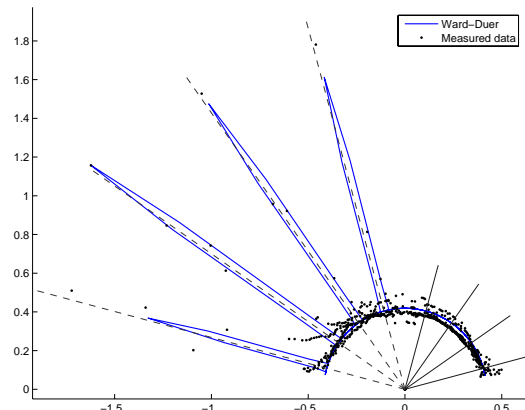
Rendered Images



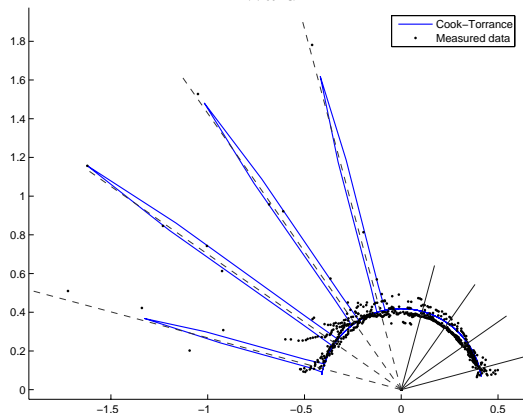
BRDF Plots in the incidence plane (Cubic root applied)



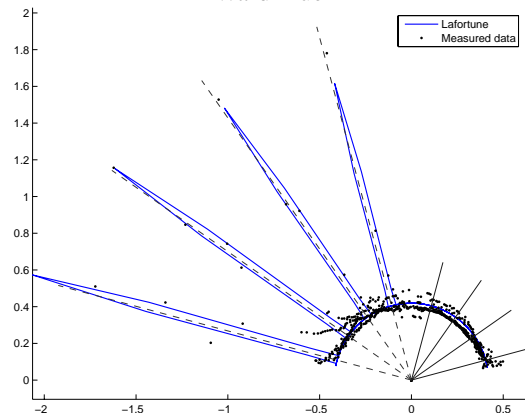
Ward



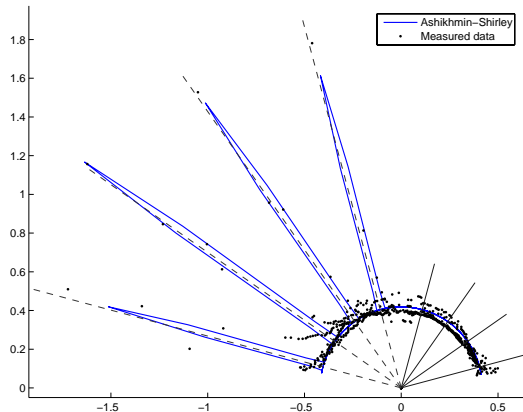
Ward-Duer



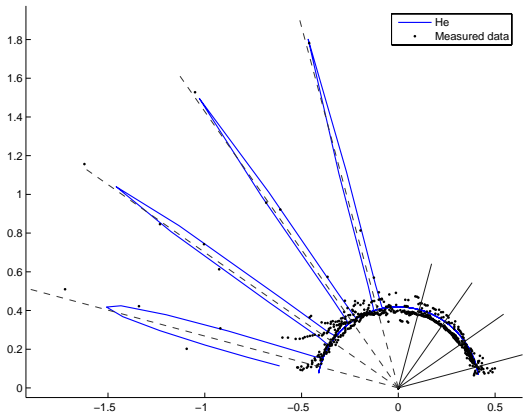
Cook-Torrance



Lafortune



Ashikhmin-Shirley



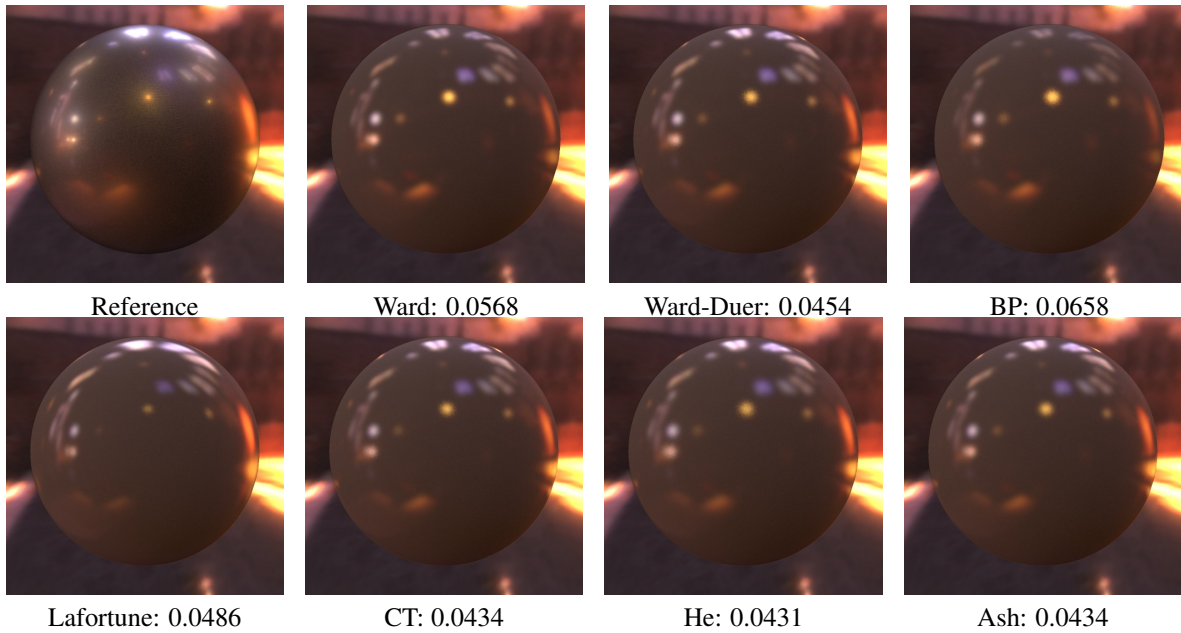
He

Material Name: alum-bronze

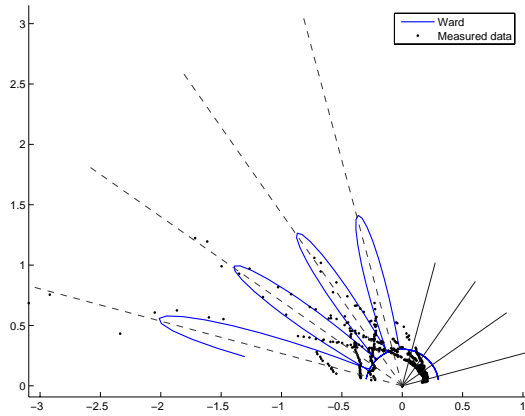
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.0851	0.0586	0.0294	0.0484	0.0274	0.0135	0.0357			0.0568
Ward-Duer	0.0856	0.0585	0.0291	0.032	0.0189	0.00986	0.0374			0.0454
Blinn-Phong	0.0864	0.0597	0.0302	0.015	0.00818	0.00381	1.29e+003			0.0658
Lafortune et al.	0.0923	0.0625	0.0311	0.322	0.193	0.105	-0.579	0.574	630	0.0486
Cook-Torrance	0.0886	0.0602	0.0299	0.118	0.0698	0.0371	0.203	0.0367		0.0434
He et al.	0.0866	0.0589	0.0292	0.165	0.0994	0.0532	24	0.514	2.33	0.0431
Ashikhmin-Shirley	0.0877	0.0598	0.0297	0.108	0.0637	0.0337	0.249	1.35e+003		0.0434

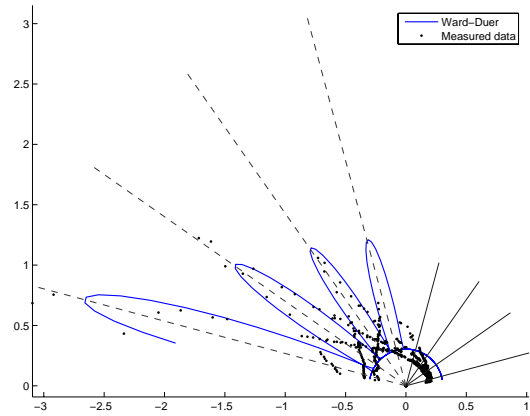
Rendered Images



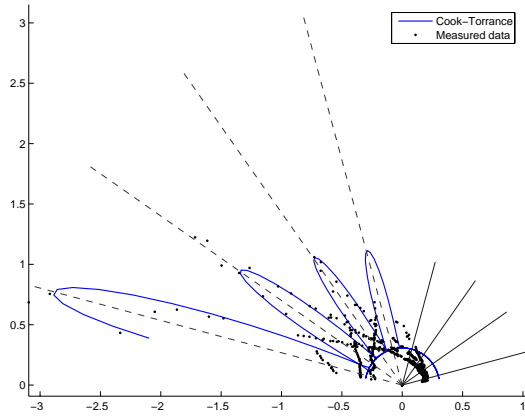
BRDF Plots in the incidence plane (Cubic root applied)



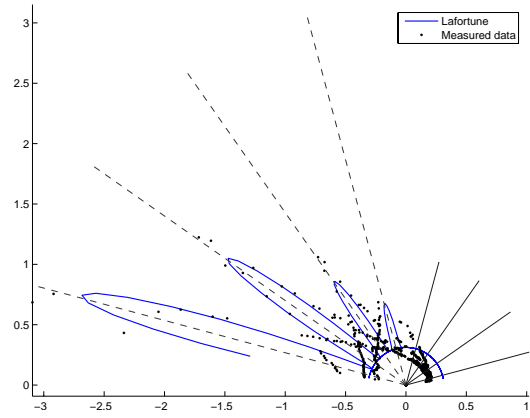
Ward



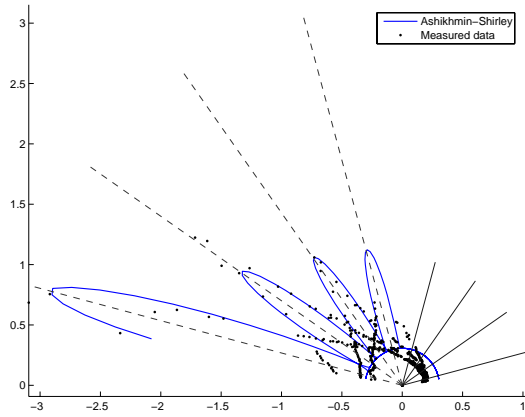
Ward-Duer



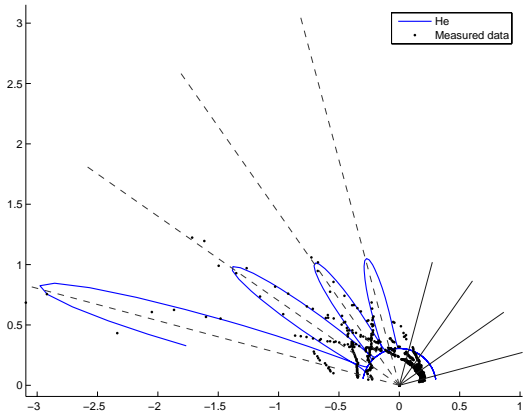
Cook-Torrance



Lafortune



Ashikhmin-Shirley



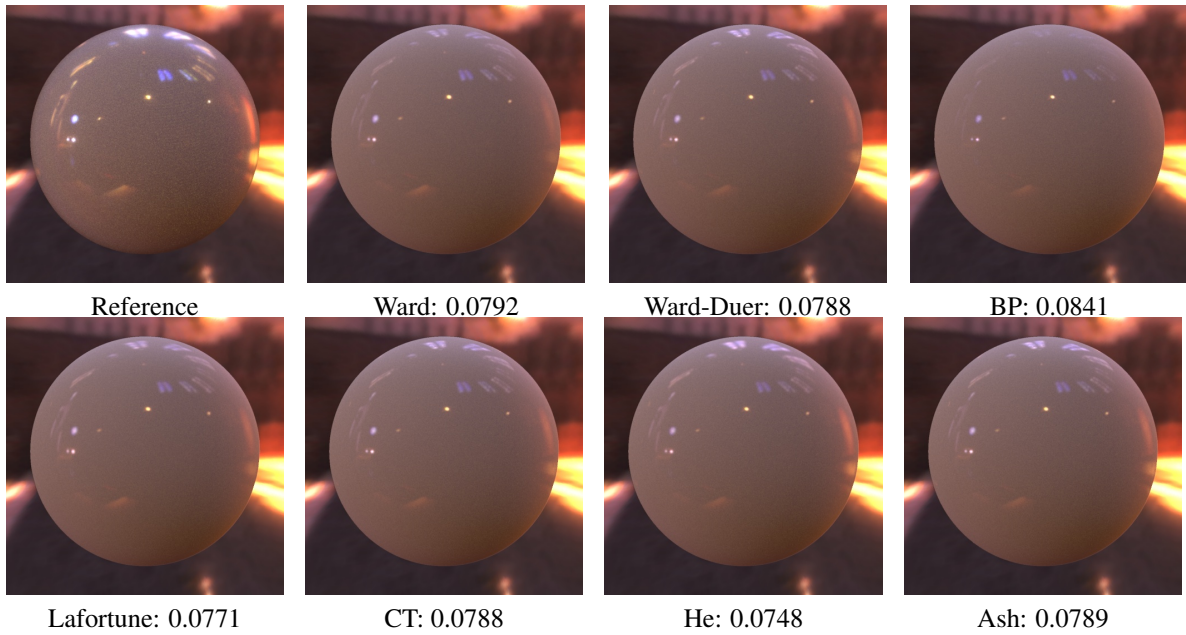
He

Material Name: alumina-oxide

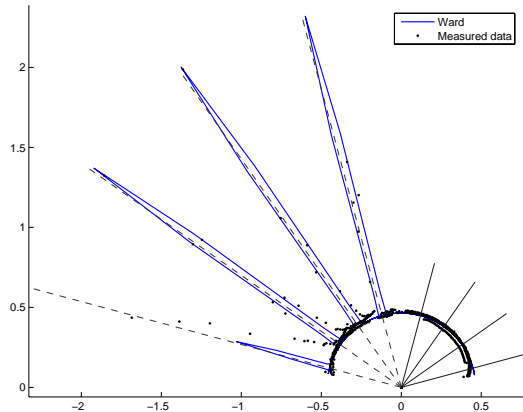
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.307	0.247	0.15	0.0113	0.00714	0.007	0.00805			0.0792
Ward-Duer	0.308	0.247	0.15	0.00783	0.00483	0.00449	0.00748			0.0788
Blinn-Phong	0.31	0.248	0.151	0.00206	0.00133	0.00171	6.11e+004			0.0841
Lafortune et al.	0.306	0.246	0.15	0.0212	0.0122	0.011	-0.577	0.577	7.69e+003	0.0771
Cook-Torrance	0.308	0.247	0.15	0.015	0.00927	0.00864	0.538	0.00756		0.0788
He et al.	0.306	0.246	0.15	1.13	0.631	0.583	28	0.0759	1.26	0.0748
Ashikhmin-Shirley	0.308	0.247	0.15	0.0155	0.00952	0.00885	0.5	3.6e+004		0.0789

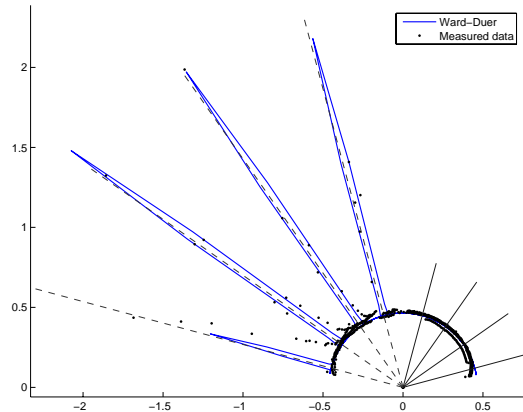
Rendered Images



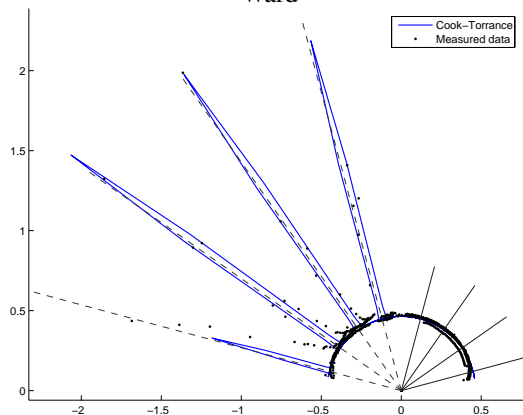
BRDF Plots in the incidence plane (Cubic root applied)



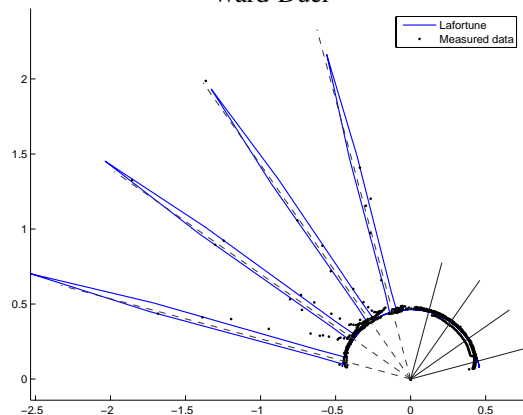
Ward



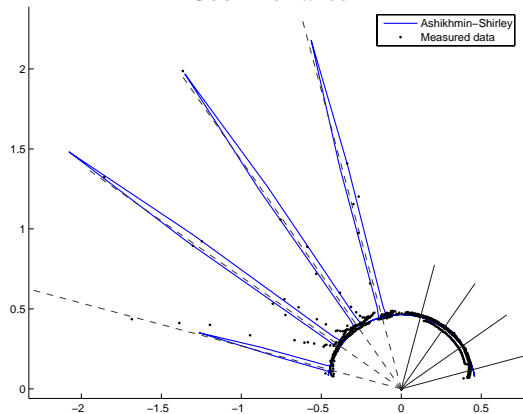
Ward-Duer



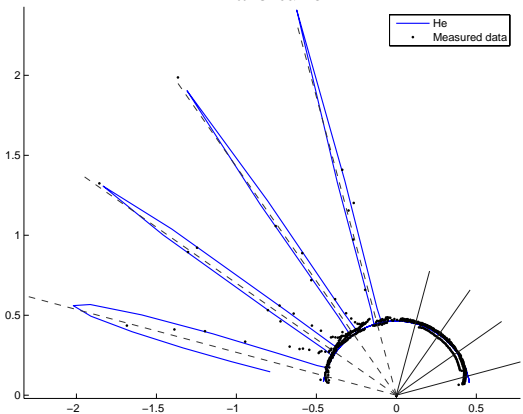
Cook-Torrance



Lafortune



Ashikhmin-Shirley



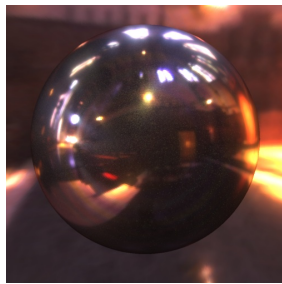
He

Material Name: aluminium

Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.0357	0.0304	0.0251	0.0708	0.0537	0.026	0.00845			0.344
Ward-Duer	0.0418	0.0356	0.0272	0.0461	0.0344	0.017	0.00785			0.363
Blinn-Phong	0.0335	0.028	0.0244	0.0243	0.0187	0.00893	2.43e+004			0.348
Lafortune et al.	0.0335	0.0287	0.024	0.0759	0.0576	0.0281	-0.577	0.577	7.51e+003	0.341
Cook-Torrance	0.0418	0.0356	0.0273	0.0799	0.06	0.0294	0.59	0.00776		0.36
He et al.	0.0326	0.028	0.0241	0.0912	0.0693	0.0332	33.1	0.146	14.4	0.331
Ashikhmin-Shirley	0.0429	0.0363	0.0277	0.0454	0.0341	0.0167	0.999	3.41e+004		0.363

Rendered Images



Reference



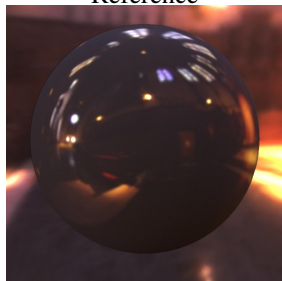
Ward: 0.344



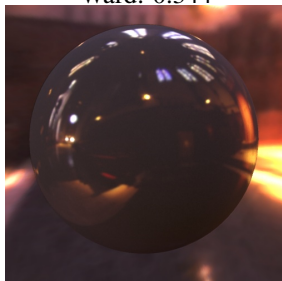
Ward-Duer: 0.363



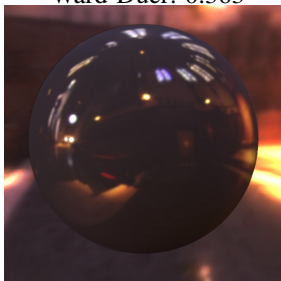
BP: 0.348



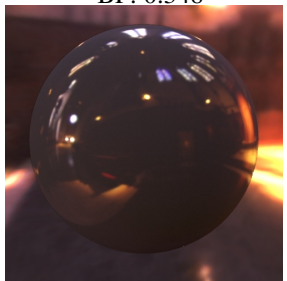
Lafortune: 0.341



CT: 0.360

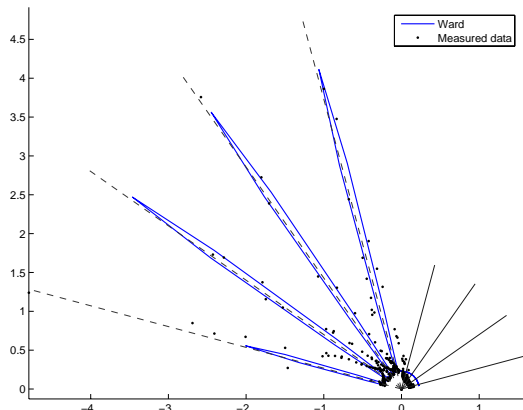


He: 0.331

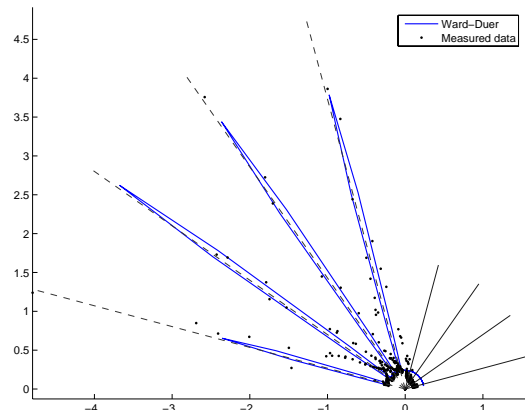


Ash: 0.363

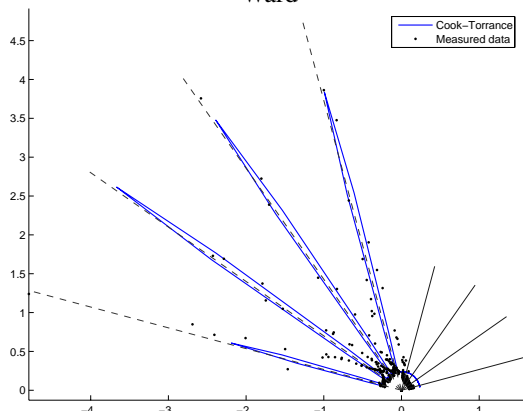
BRDF Plots in the incidence plane (Cubic root applied)



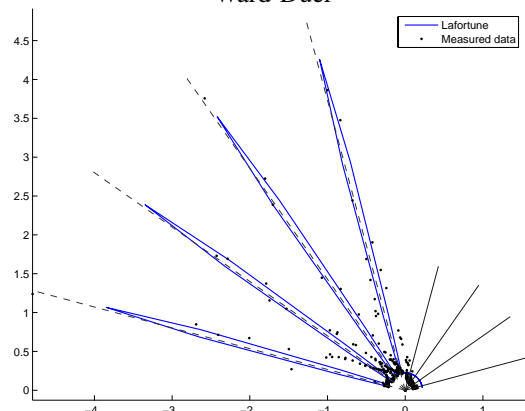
Ward



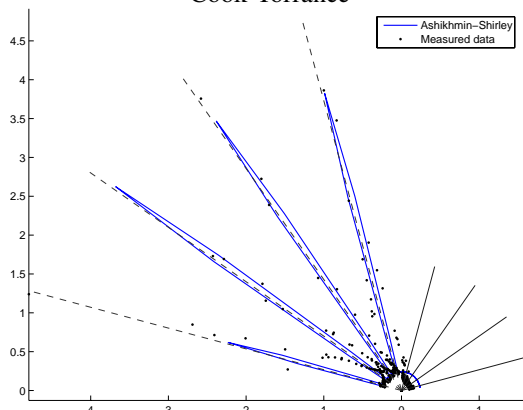
Ward-Duer



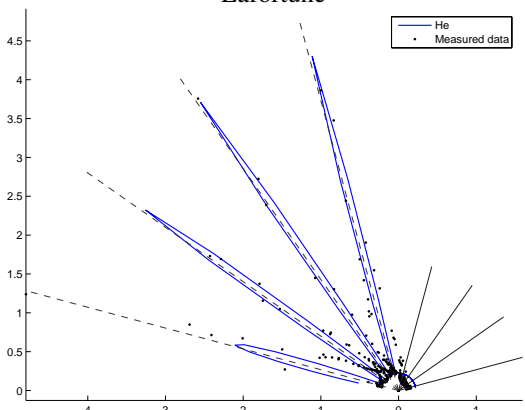
Cook-Torrance



Lafortune



Ashikhmin-Shirley



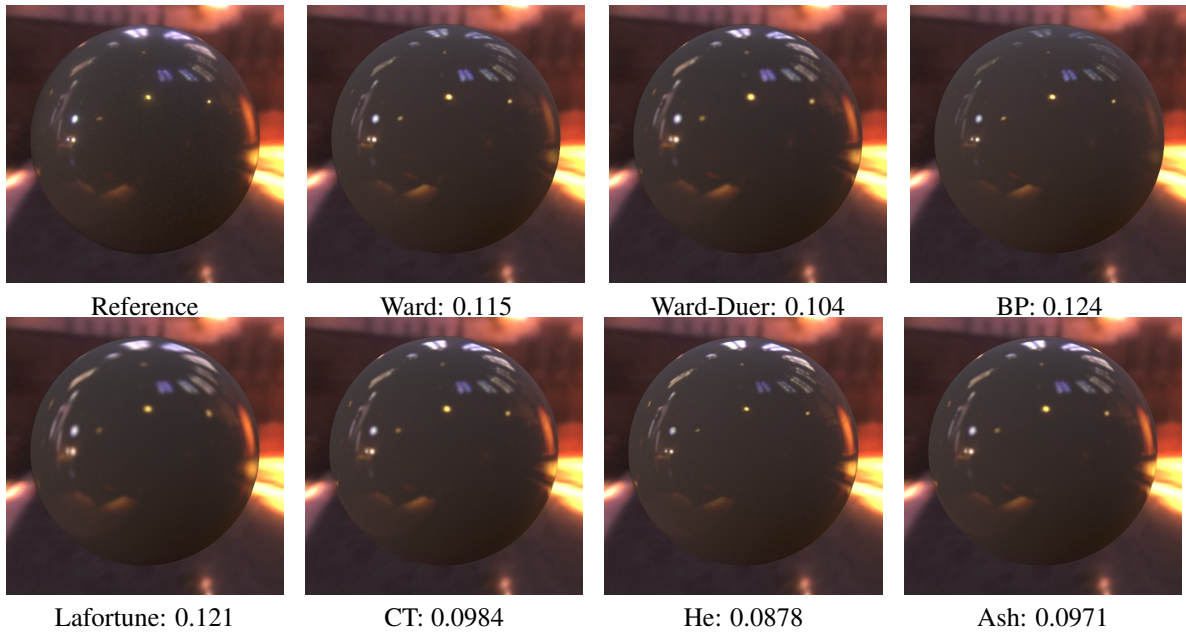
He

Material Name: aventurine

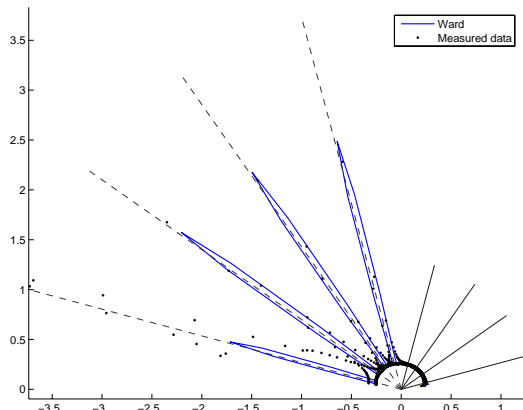
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.0592	0.0573	0.0354	0.022	0.0186	0.0104	0.0101			0.115
Ward-Duer	0.0536	0.0539	0.0337	0.0214	0.0166	0.00906	0.0148			0.104
Blinn-Phong	0.0633	0.0603	0.0372	0.00499	0.00443	0.00246	3.16e+004			0.124
Lafortune et al.	0.0523	0.0533	0.0334	0.139	0.105	0.0573	-0.578	0.577	1.59e+003	0.121
Cook-Torrance	0.0558	0.0558	0.035	0.107	0.0811	0.0432	0.15	0.0145		0.0984
He et al.	0.0622	0.0601	0.0373	0.852	0.688	0.36	56	0.188	1.2	0.0878
Ashikhmin-Shirley	0.0564	0.0562	0.0352	0.118	0.0903	0.0479	0.136	1.04e+004		0.0971

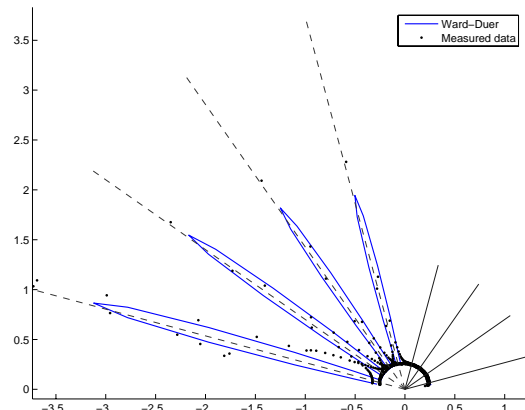
Rendered Images



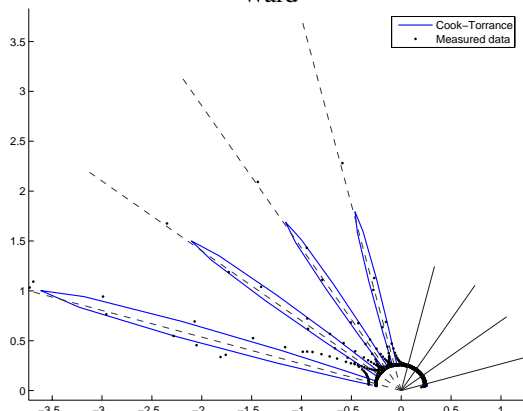
BRDF Plots in the incidence plane (Cubic root applied)



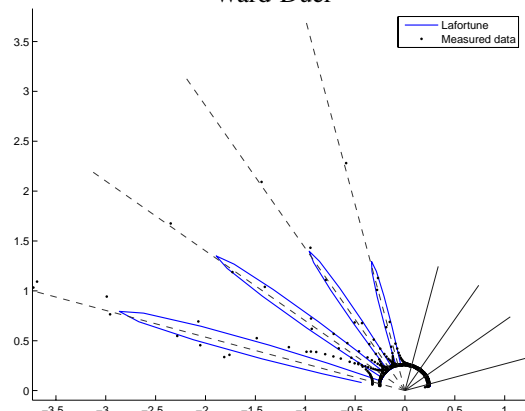
Ward



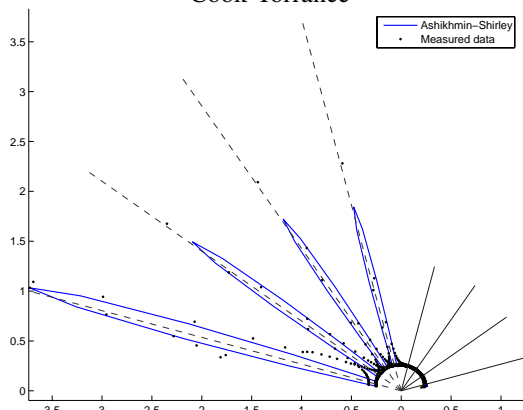
Ward-Duer



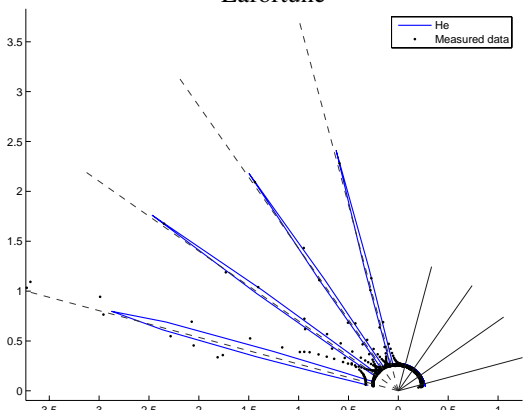
Cook-Torrance



Lafortune



Ashikhmin-Shirley



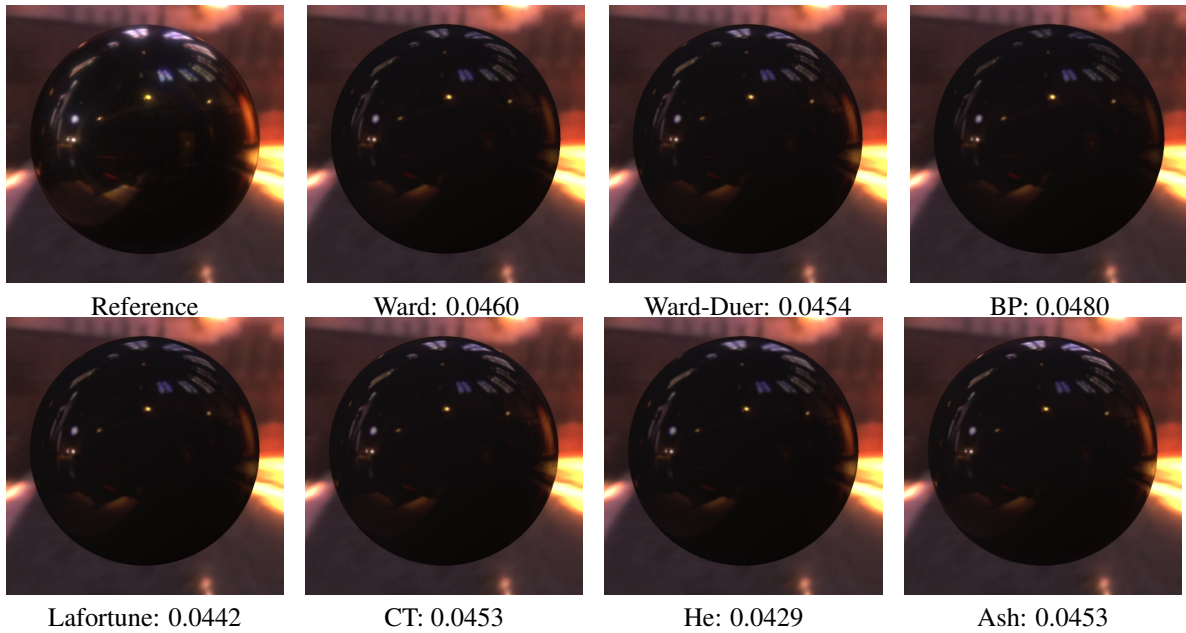
He

Material Name: black-bball

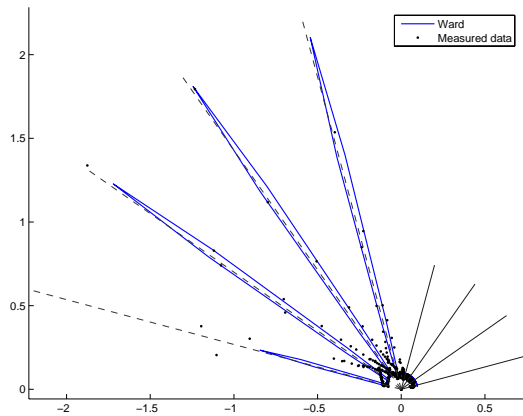
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.00277	0.00261	0.00226	0.00794	0.00511	0.00308	0.00781			0.046
Ward-Duer	0.00288	0.00274	0.00232	0.00568	0.00359	0.0022	0.00756			0.0454
Blinn-Phong	0.00289	0.00263	0.00227	0.00253	0.00166	0.000999	3e+004			0.048
Lafortune et al.	0.00269	0.00259	0.00217	0.0114	0.0073	0.00456	-0.577	0.577	9.61e+003	0.0442
Cook-Torrance	0.00299	0.00281	0.00236	0.02	0.0126	0.00771	0.274	0.00737		0.0453
He et al.	0.00253	0.00237	0.002	37	24.5	15.4	28	0.0108	1.21	0.0429
Ashikhmin-Shirley	0.00321	0.00295	0.00245	0.0436	0.0276	0.0169	0.116	4.08e+004		0.0453

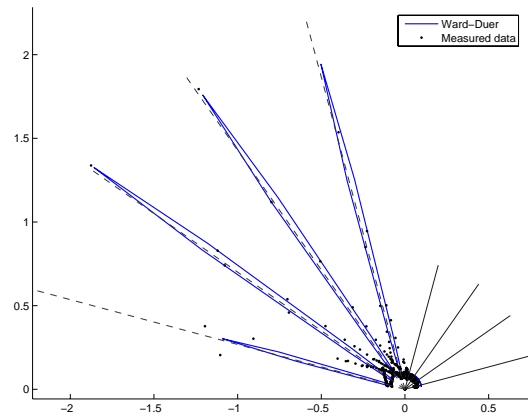
Rendered Images



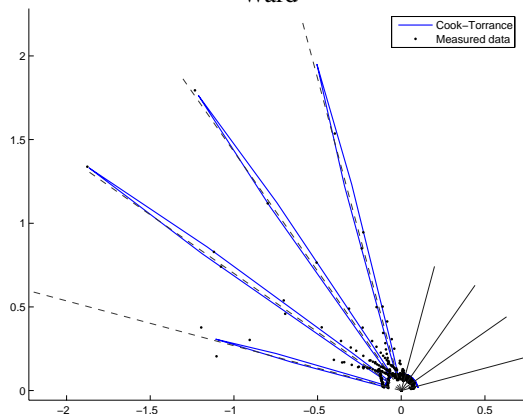
BRDF Plots in the incidence plane (Cubic root applied)



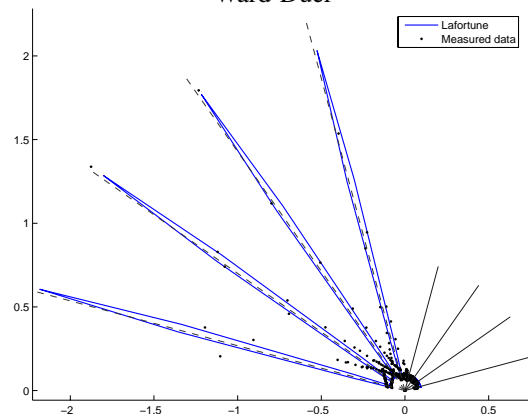
Ward



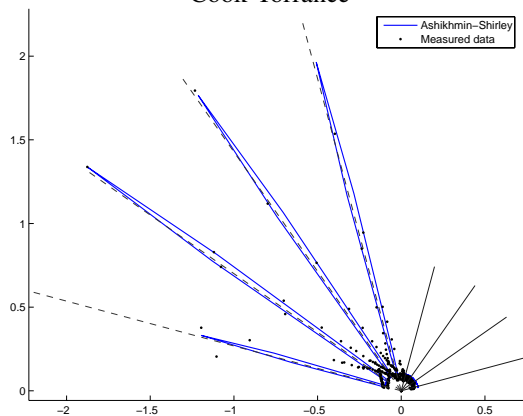
Ward-Duer



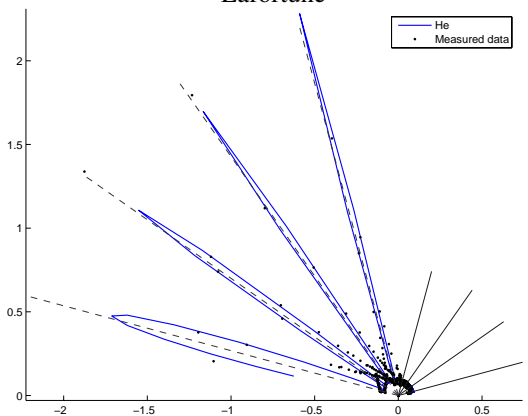
Cook-Torrance



Lafortune



Ashikhmin-Shirley



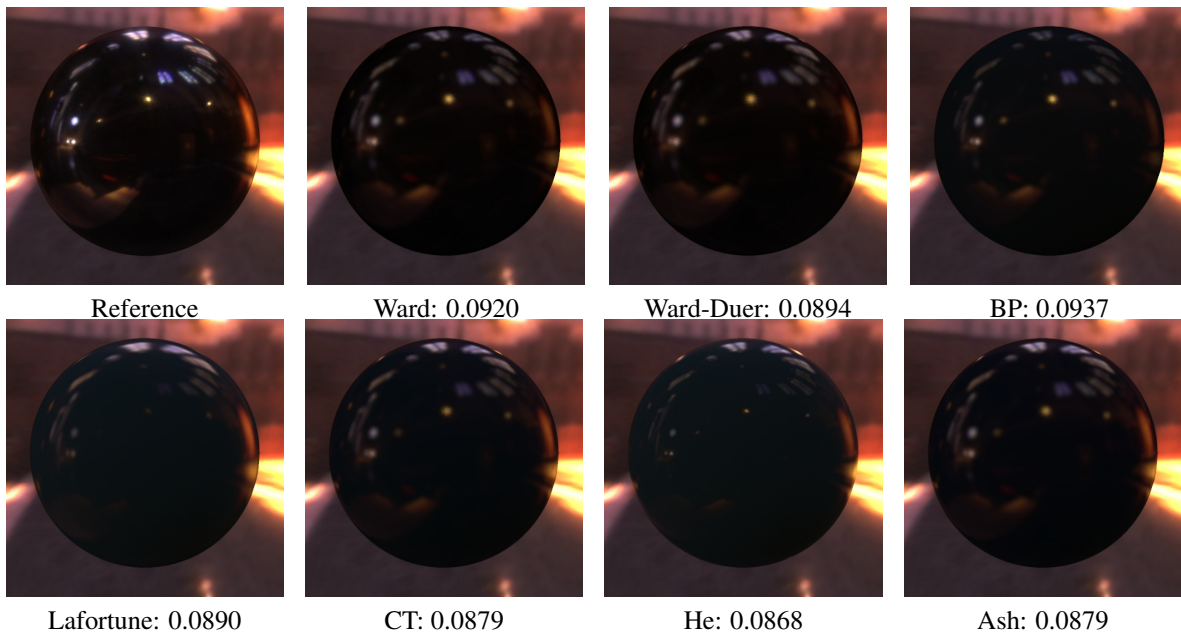
He

Material Name: black-obsidian

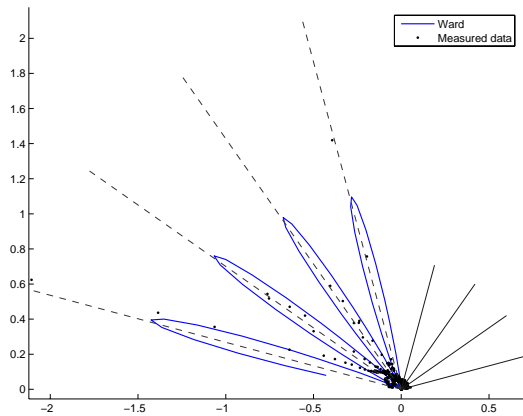
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0	0	0	0.00918	0.00591	0.00329	0.0227			0.092
Ward-Duer	0	0	0	0.00707	0.00432	0.00233	0.0247			0.0894
Blinn-Phong	0.000547	0.00133	0.0013	0.00211	0.00148	0.000854	5e+003			0.0937
Lafortune et al.	0.00152	0.00605	0.00576	0.107	0.0644	0.033	-0.578	0.575	1.61e+003	0.089
Cook-Torrance	0.000204	0.00161	0.00224	0.0398	0.025	0.0133	0.0842	0.0239		0.0879
He et al.	0.00162	0.00587	0.00536	6.26e+005	4.17e+005	2.23e+005	28	0.0297	1	0.0868
Ashikhmin-Shirley	0	0.000662	0.00151	0.0397	0.0253	0.0135	0.109	3.35e+003		0.0879

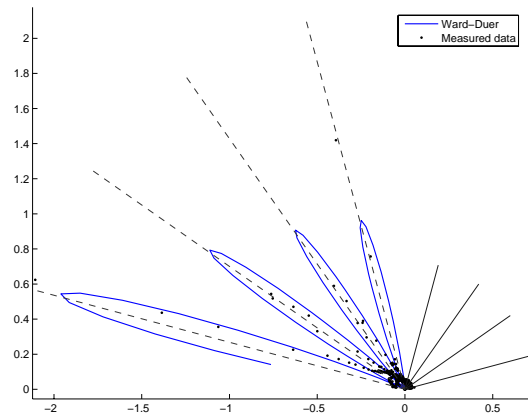
Rendered Images



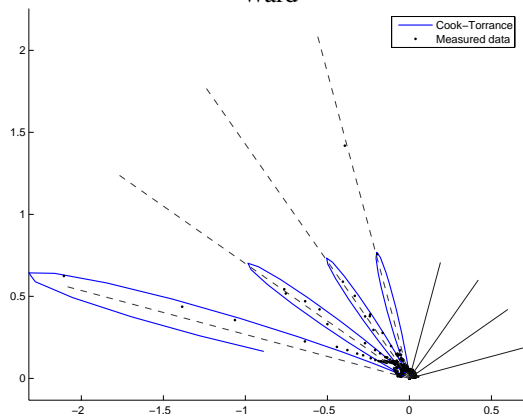
BRDF Plots in the incidence plane (Cubic root applied)



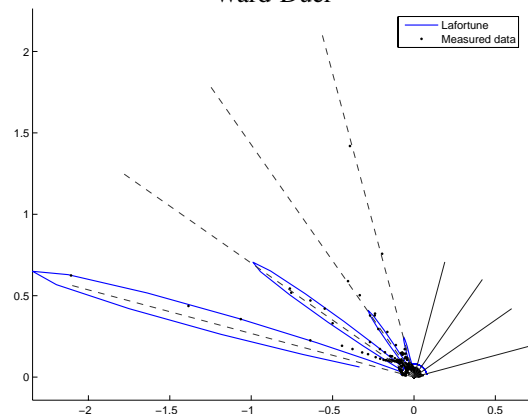
Ward



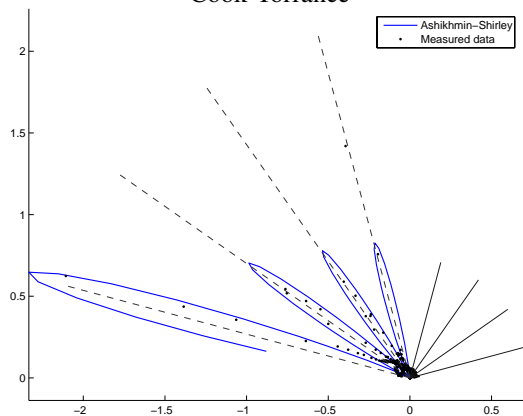
Ward-Duer



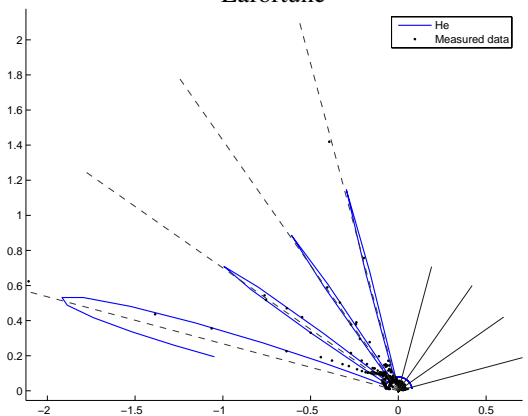
Cook-Torrance



Lafortune



Ashikhmin-Shirley



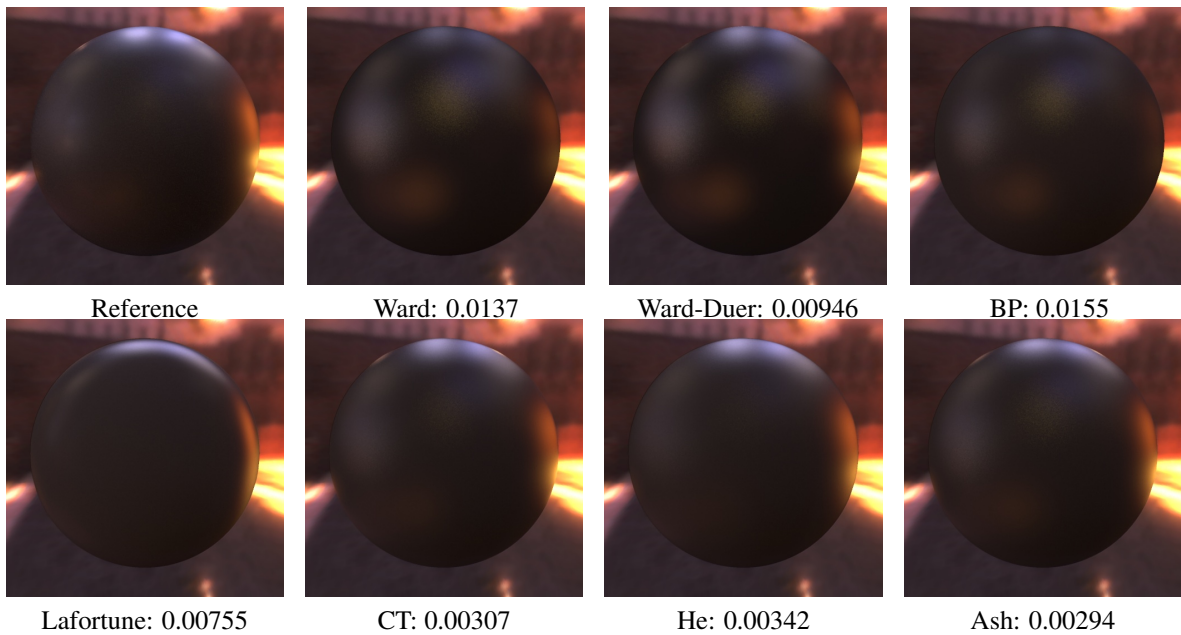
He

Material Name: black-oxidized-steel

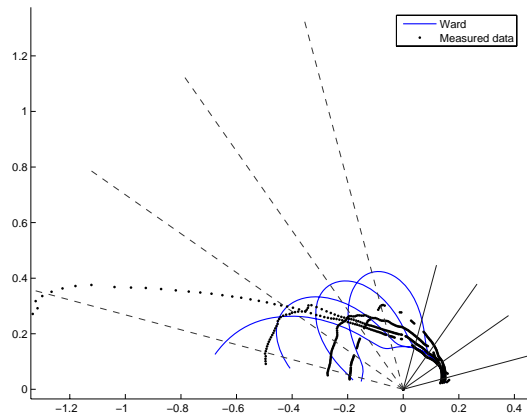
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.0108	0.00876	0.00596	0.0369	0.0298	0.0194	0.198			0.0137
Ward-Duer	0.00929	0.00768	0.00534	0.0265	0.0213	0.0137	0.181			0.00946
Blinn-Phong	0.0192	0.0156	0.0104	0.00692	0.00559	0.00365	62			0.0155
Lafortune et al.	0.0264	0.0215	0.0143	0.324	0.257	0.165	-0.608	0.51	72.5	0.00755
Cook-Torrance	0.0186	0.0152	0.0102	0.229	0.182	0.117	0.035	0.19		0.00307
He et al.	0.0194	0.0159	0.0106	0.949	0.757	0.488	4.05	0.481	1.17	0.00342
Ashikhmin-Shirley	0.0165	0.0136	0.00918	0.299	0.237	0.153	0.0488	43.9		0.00294

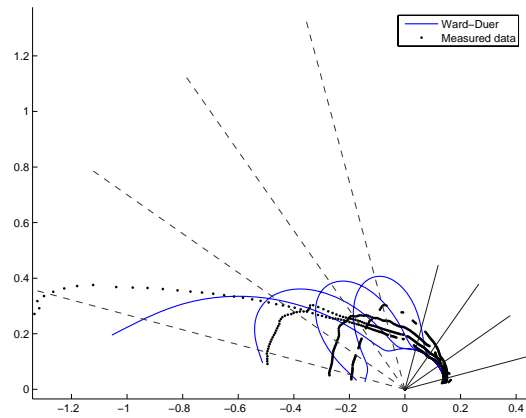
Rendered Images



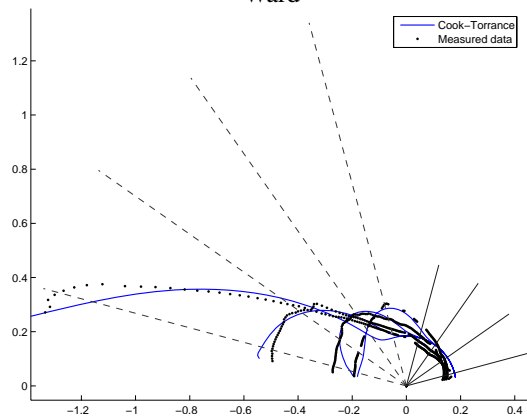
BRDF Plots in the incidence plane (Cubic root applied)



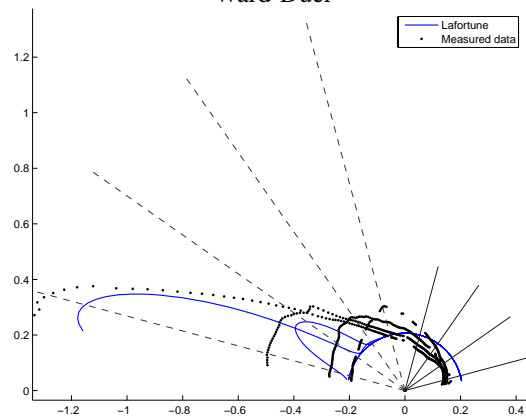
Ward



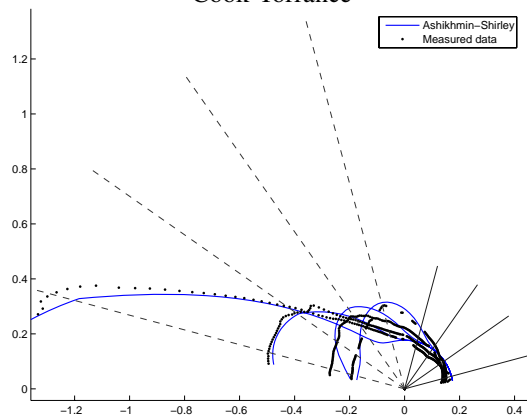
Ward-Duer



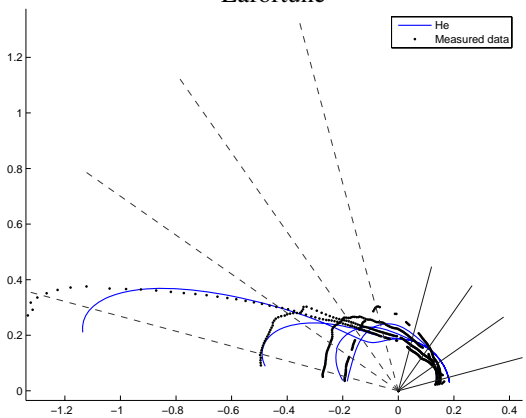
Cook-Torrance



Lafortune



Ashikhmin-Shirley



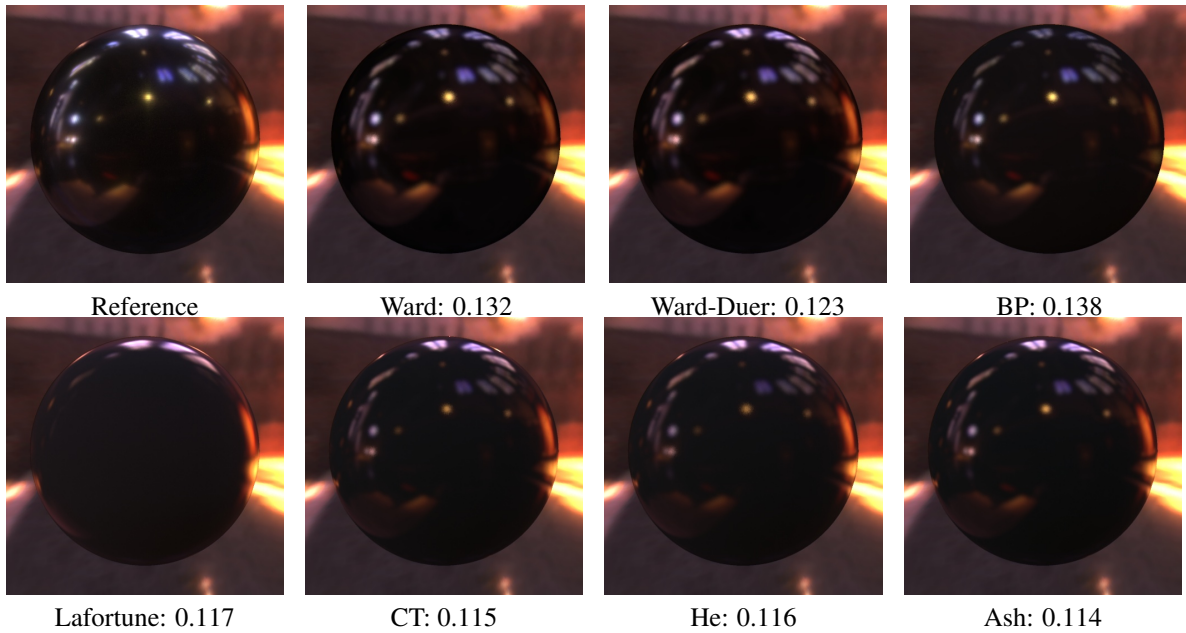
He

Material Name: black-phenolic

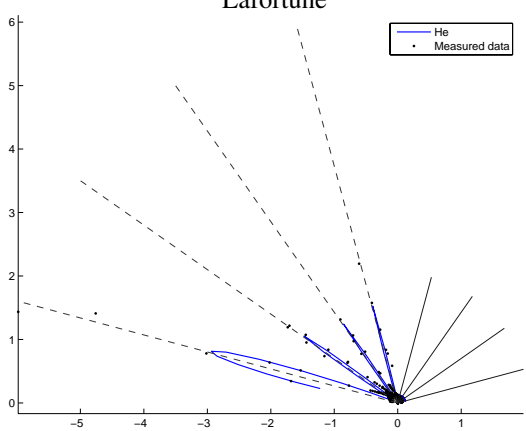
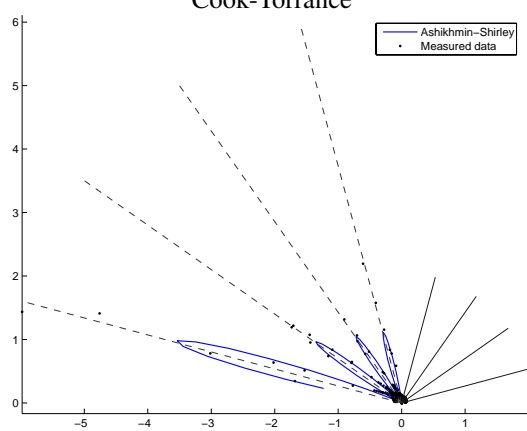
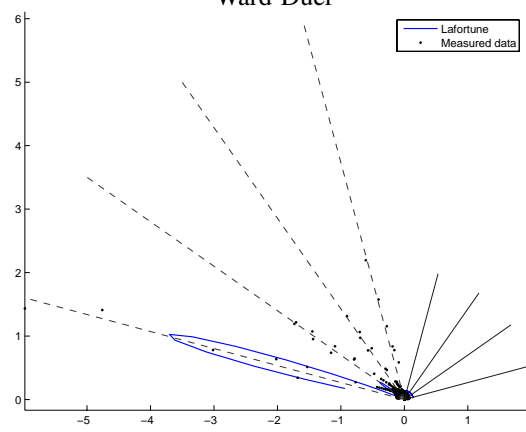
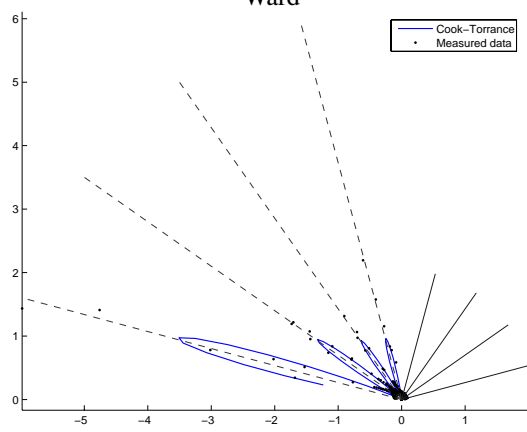
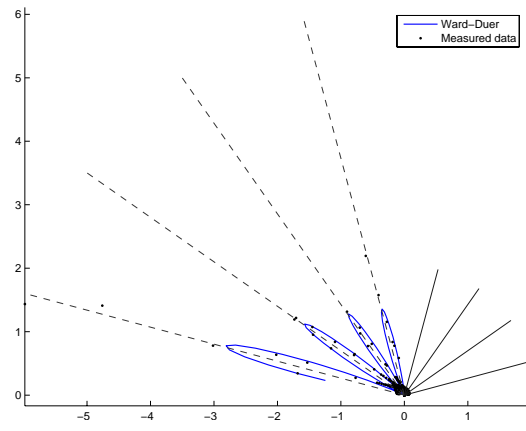
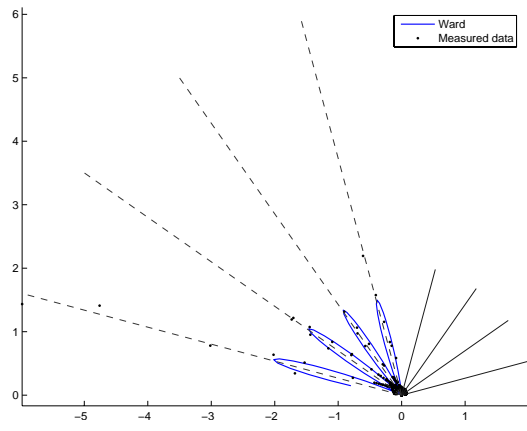
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0	0	0	0.0302	0.0204	0.0152	0.0257			0.132
Ward-Duer	0	2.51e-005	0	0.0227	0.0135	0.0101	0.0263			0.123
Blinn-Phong	0.00272	0.0022	0.00169	0.00684	0.00508	0.00374	3.66e+003			0.138
Lafortune et al.	0.00822	0.00784	0.00694	1.71	0.782	0.525	-0.581	0.57	1.25e+003	0.117
Cook-Torrance	0.00313	0.00469	0.00397	0.157	0.0811	0.0598	0.0388	0.023		0.115
He et al.	0.00338	0.00492	0.00415	0.218	0.11	0.0818	50	0.663	1.37	0.116
Ashikhmin-Shirley	0.00205	0.00402	0.0034	0.152	0.0791	0.0577	0.0643	3.63e+003		0.114

Rendered Images



BRDF Plots in the incidence plane (Cubic root applied)



Ashikhmin-Shirley

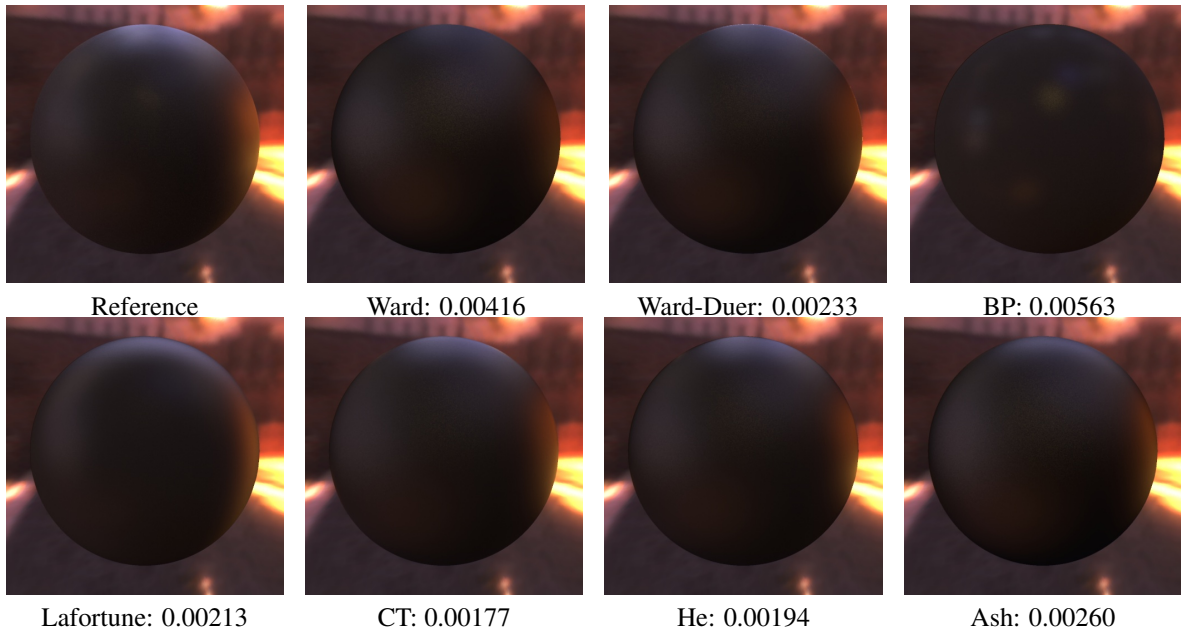
He

Material Name: black-plastic-soft

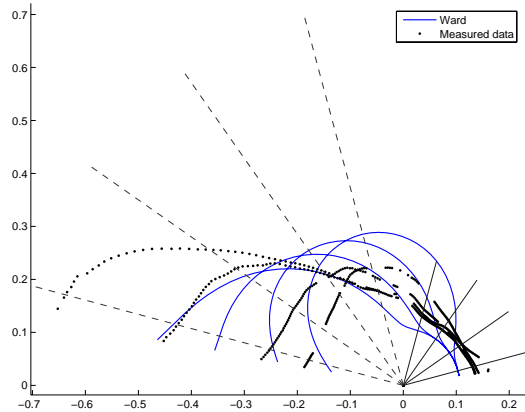
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.00357	0.00288	0.00204	0.0315	0.0259	0.0175	0.331			0.00416
Ward-Duer	0.00373	0.00309	0.00221	0.0204	0.0166	0.0112	0.32			0.00233
Blinn-Phong	0.0173	0.0142	0.00972	0.0014	0.00114	0.000769	192			0.00563
Lafortune et al.	0.0122	0.01	0.00692	0.11	0.0894	0.0601	-0.638	0.431	14.1	0.00213
Cook-Torrance	0.00601	0.005	0.00352	0.0939	0.0765	0.0515	0.136	0.325		0.00177
He et al.	0.00635	0.00528	0.00371	0.127	0.103	0.0693	11.9	1.73	2.03	0.00194
Ashikhmin-Shirley	7.2e-005	8.58e-005	0.000196	0.0325	0.0266	0.018	0.903	13.6		0.0026

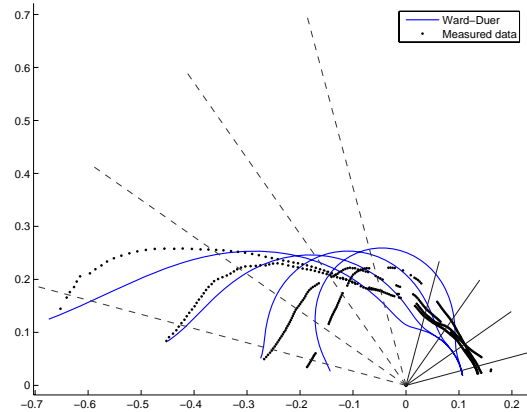
Rendered Images



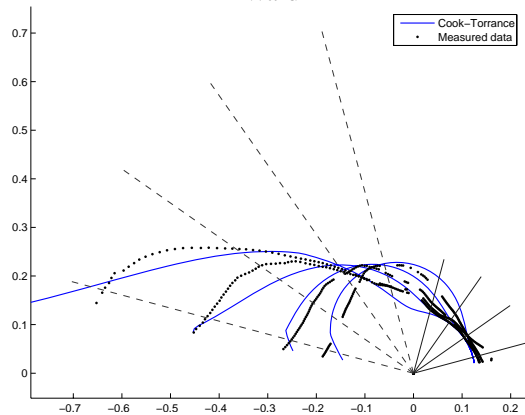
BRDF Plots in the incidence plane (Cubic root applied)



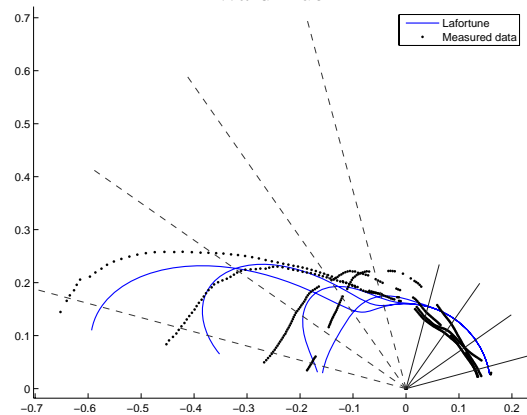
Ward



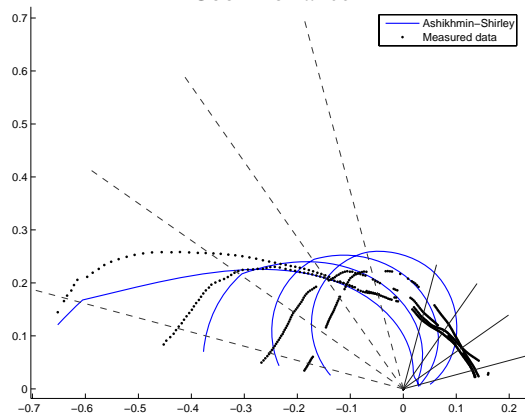
Ward-Duer



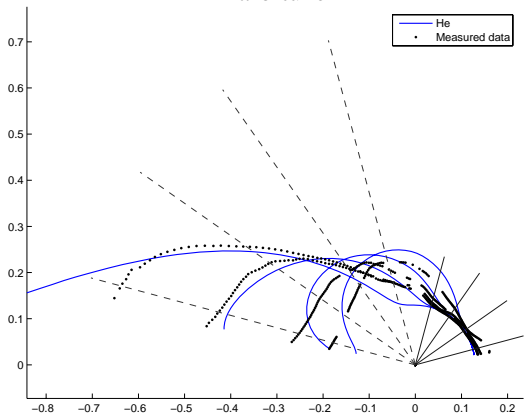
Cook-Torrance



Lafortune



Ashikhmin-Shirley



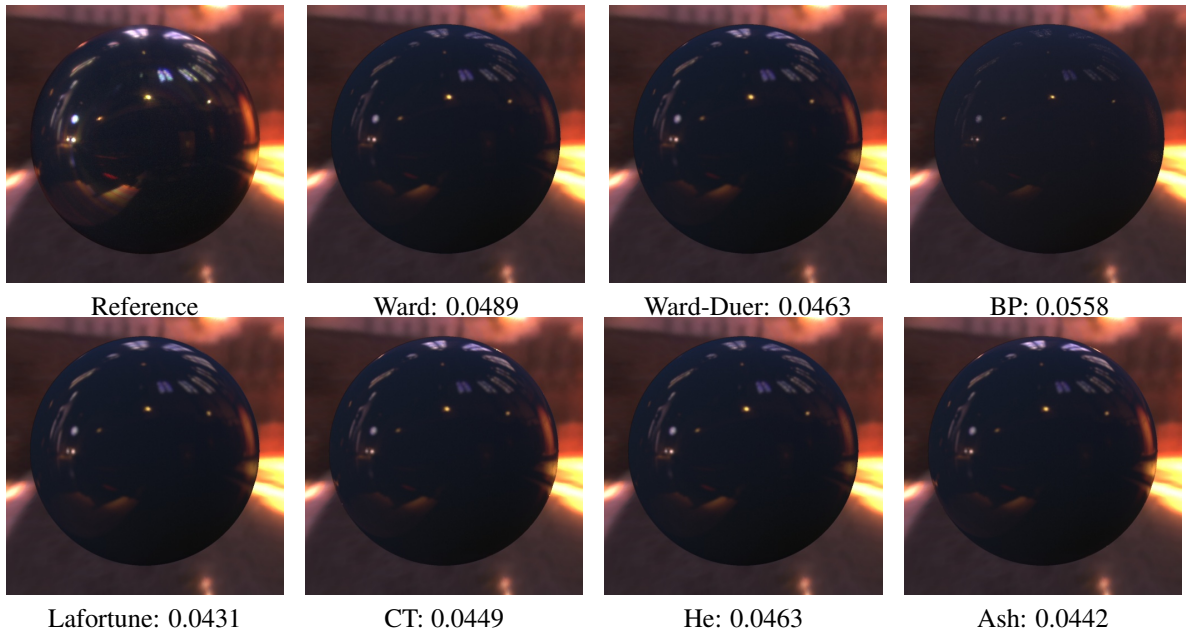
He

Material Name: blue-bball

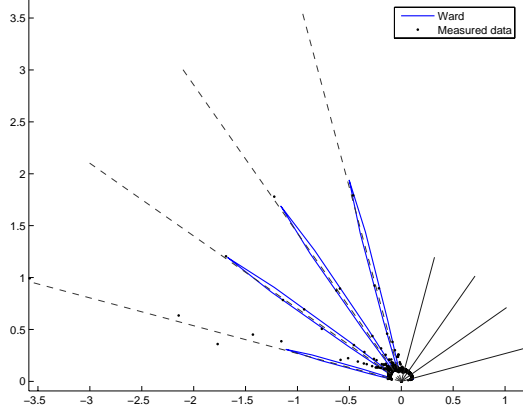
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.00482	0.0114	0.0185	0.00842	0.00546	0.00362	0.00912			0.0489
Ward-Duer	0.00431	0.0111	0.0183	0.00669	0.00429	0.00278	0.0102			0.0463
Blinn-Phong	0.00793	0.0134	0.0198	0.000914	0.000609	0.000417	1.04e+005			0.0558
Lafortune et al.	0.00446	0.011	0.0184	0.0322	0.022	0.0135	-0.577	0.577	5.22e+003	0.0431
Cook-Torrance	0.00462	0.0113	0.0185	0.047	0.03	0.0192	0.109	0.0102		0.0449
He et al.	0.0045	0.0111	0.0184	0.0122	0.00803	0.00516	56.3	0.274	7.1	0.0463
Ashikhmin-Shirley	0.00464	0.0113	0.0185	0.066	0.042	0.0269	0.0804	2.04e+004		0.0442

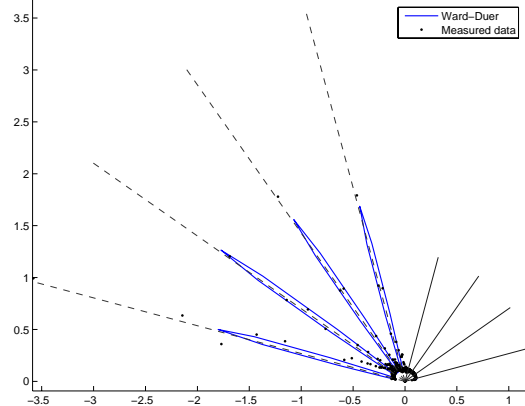
Rendered Images



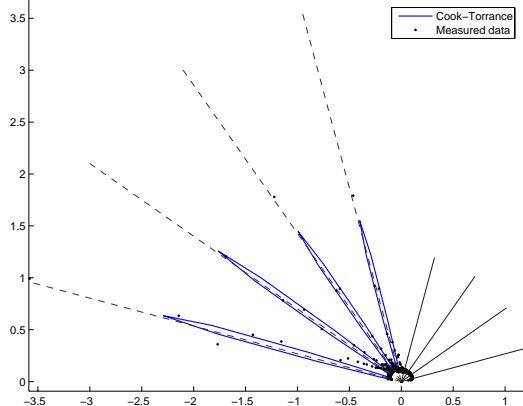
BRDF Plots in the incidence plane (Cubic root applied)



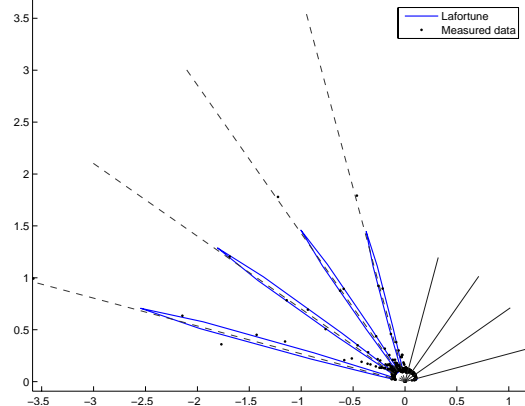
Ward



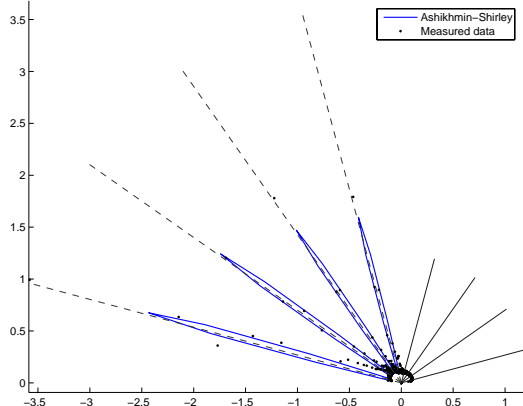
Ward-Duer



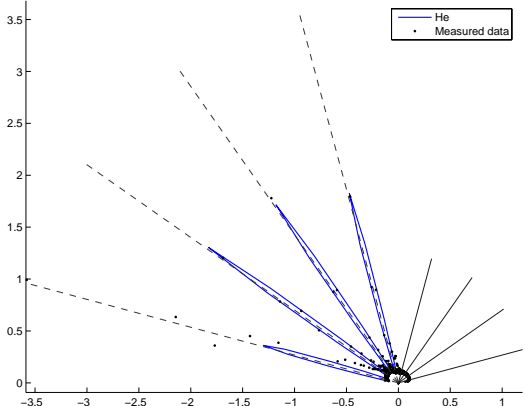
Cook-Torrance



Lafortune



Ashikhmin-Shirley



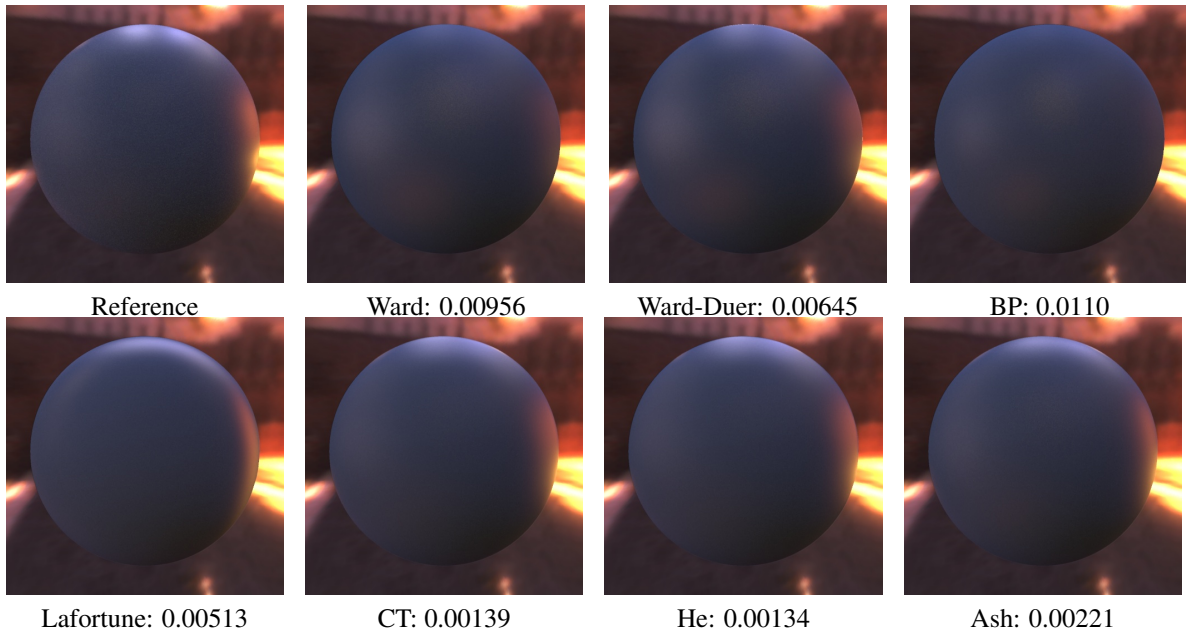
He

Material Name: blue-rubber

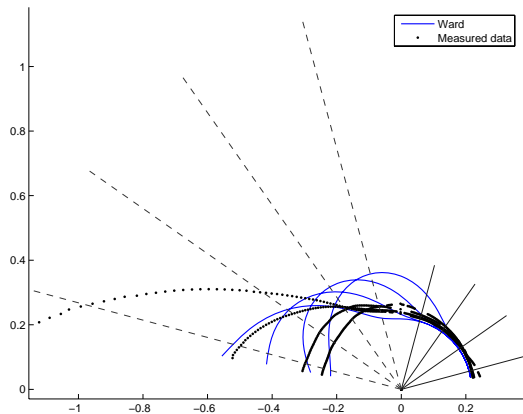
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.0309	0.0601	0.0891	0.0399	0.0343	0.0237	0.289			0.00956
Ward-Duer	0.029	0.0589	0.0885	0.0286	0.0241	0.0163	0.267			0.00645
Blinn-Phong	0.0425	0.0698	0.0957	0.00533	0.00471	0.00333	43.6			0.011
Lafortune et al.	0.0464	0.0736	0.0986	0.291	0.239	0.159	-0.635	0.44	32.6	0.00513
Cook-Torrance	0.0382	0.0669	0.094	0.247	0.204	0.136	0.0366	0.276		0.00139
He et al.	0.0378	0.0665	0.0938	0.549	0.454	0.302	23.8	3.48	1.31	0.00134
Ashikhmin-Shirley	0.0358	0.0649	0.0927	0.341	0.281	0.187	0.0532	20		0.00221

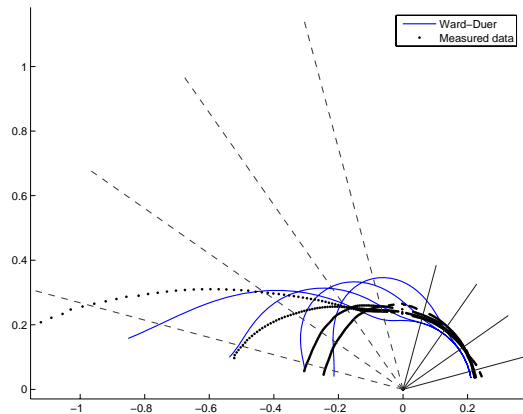
Rendered Images



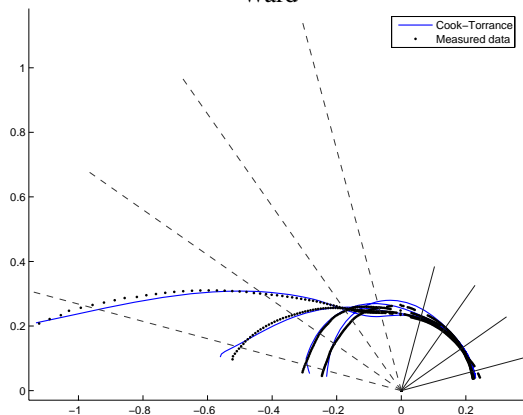
BRDF Plots in the incidence plane (Cubic root applied)



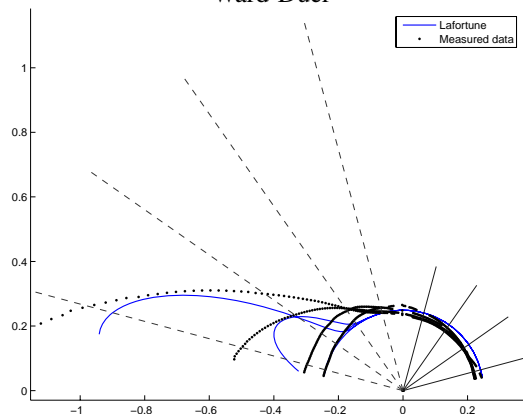
Ward



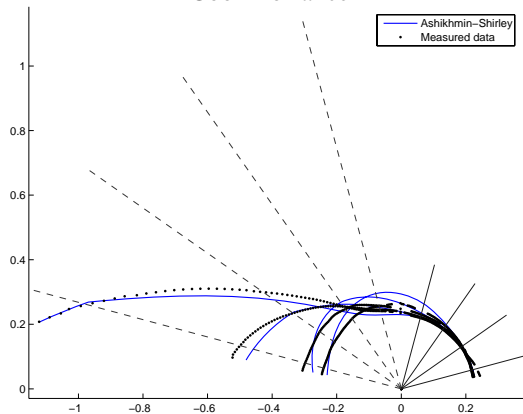
Ward-Duer



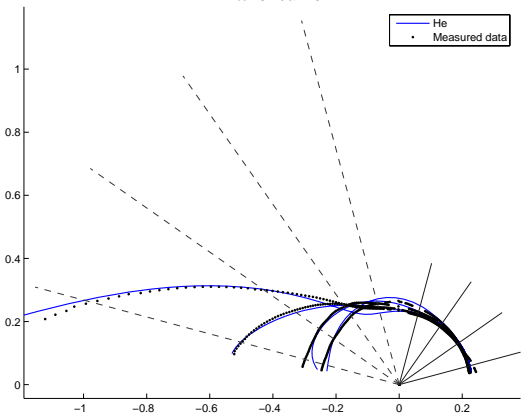
Cook-Torrance



Lafortune



Ashikhmin-Shirley



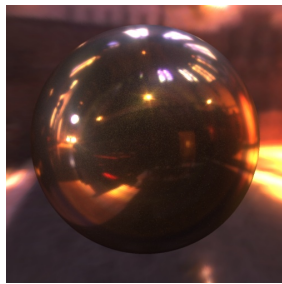
He

Material Name: brass

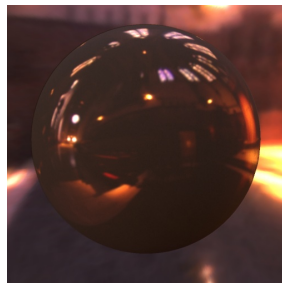
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.041	0.0285	0.0132	0.107	0.0433	0.015	0.00729			0.415
Ward-Duer	0.0486	0.0317	0.0151	0.0715	0.0288	0.00965	0.00659			0.411
Blinn-Phong	0.0382	0.0272	0.0119	0.0367	0.015	0.00537	3.16e+004			0.447
Lafortune et al.	0.0387	0.0273	0.0123	0.118	0.0479	0.0172	-0.577	0.577	1.07e+004	0.42
Cook-Torrance	0.0475	0.0313	0.0149	0.124	0.0498	0.0167	0.596	0.00668		0.41
He et al.	0.0369	0.0268	0.0129	0.132	0.0532	0.0182	62.5	0.238	9.03	0.396
Ashikhmin-Shirley	0.0486	0.0317	0.0151	0.0717	0.0289	0.00967	0.999	4.58e+004		0.412

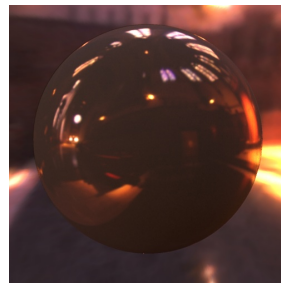
Rendered Images



Reference



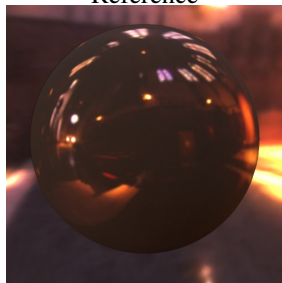
Ward: 0.415



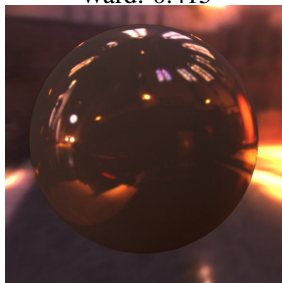
Ward-Duer: 0.411



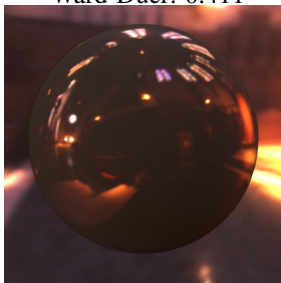
BP: 0.447



Lafortune: 0.420



CT: 0.410

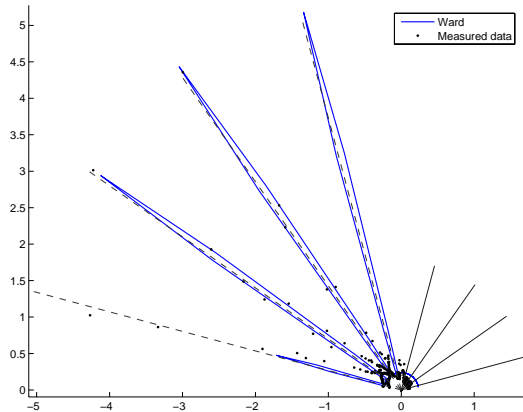


He: 0.396

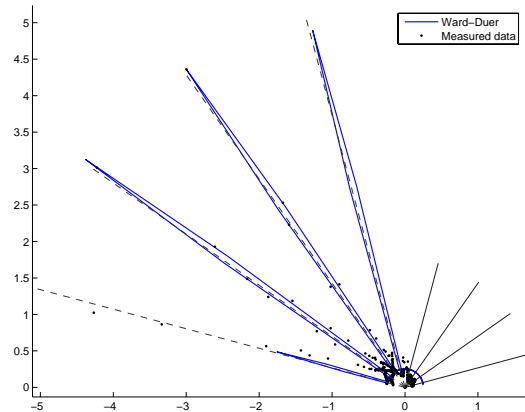


Ash: 0.412

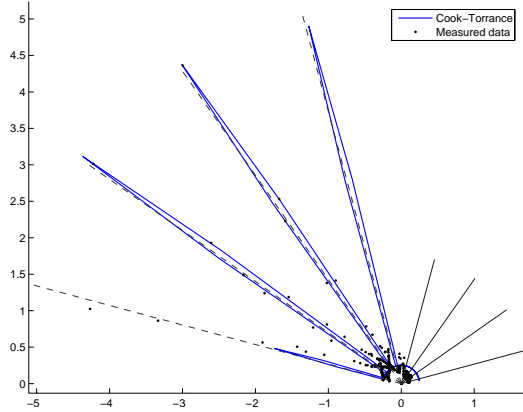
BRDF Plots in the incidence plane (Cubic root applied)



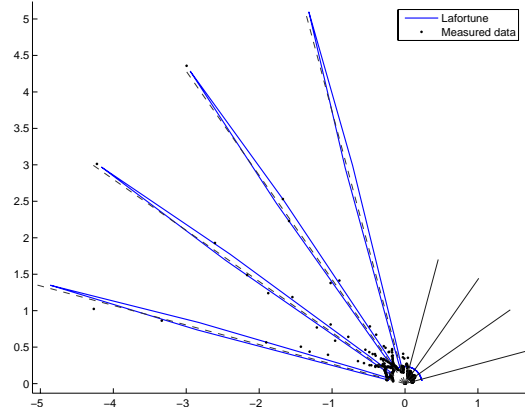
Ward



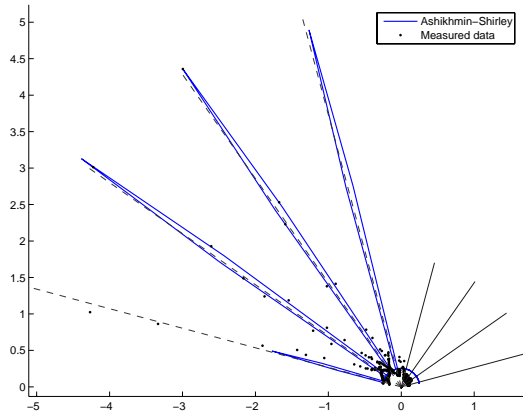
Ward-Duer



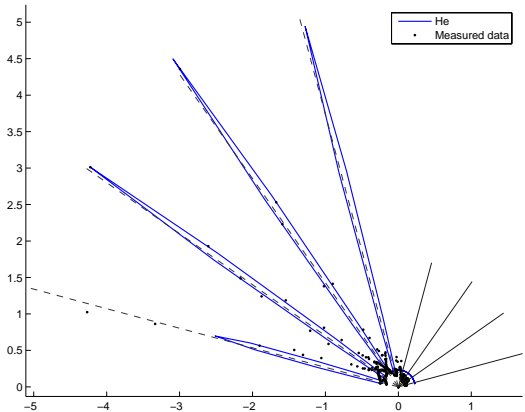
Cook-Torrance



Lafortune



Ashikhmin-Shirley



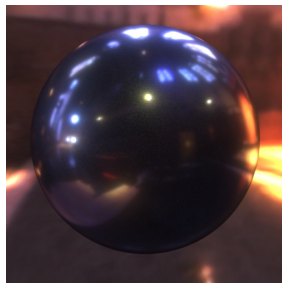
He

Material Name: ch-ball-blue-metallic

Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.0142	0.0178	0.0241	0.0362	0.0492	0.0662	0.02			0.0529
Ward-Duer	0.0168	0.0212	0.0282	0.0199	0.0274	0.0375	0.0185			0.0521
Blinn-Phong	0.0173	0.0221	0.0302	0.00854	0.0115	0.0152	8.29e+003			0.0804
Lafortune et al.	0.015	0.0189	0.0254	0.0939	0.128	0.174	-0.578	0.577	1.52e+003	0.05
Cook-Torrance	0.0162	0.0205	0.0272	0.0341	0.0468	0.0641	0.637	0.019		0.0497
He et al.	0.016	0.0202	0.0269	0.0348	0.0479	0.0655	80.4	0.776	8.92	0.049
Ashikhmin-Shirley	0.0167	0.0211	0.028	0.0204	0.0281	0.0386	0.999	5.71e+003		0.0518

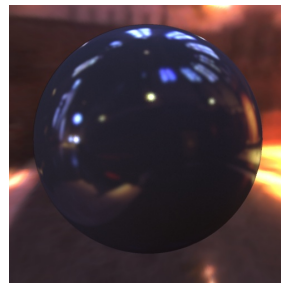
Rendered Images



Reference



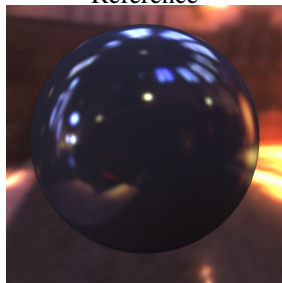
Ward: 0.0529



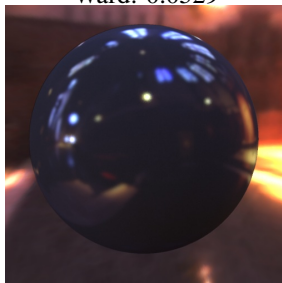
Ward-Duer: 0.0521



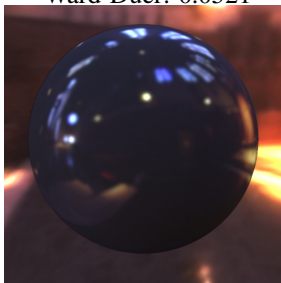
BP: 0.0804



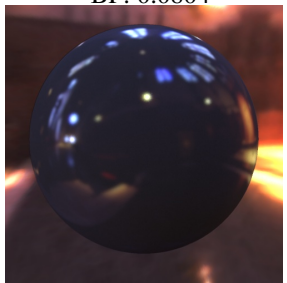
Lafortune: 0.0500



CT: 0.0497

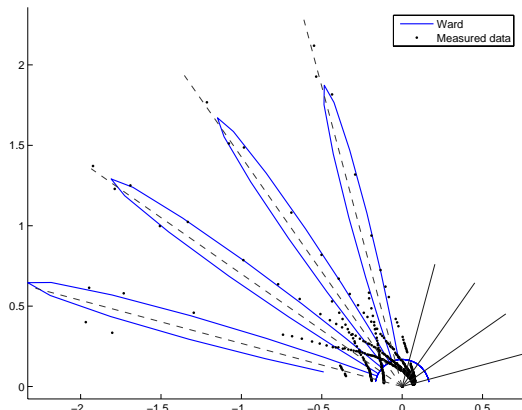


He: 0.0490

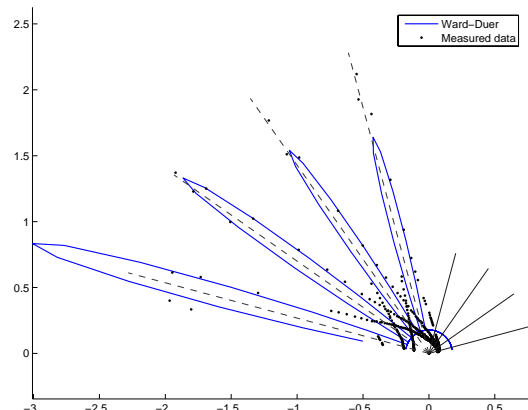


Ash: 0.0518

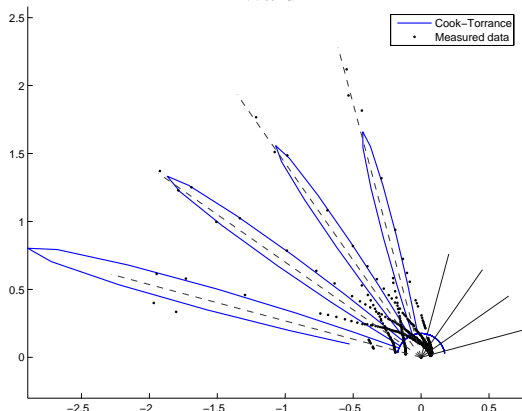
BRDF Plots in the incidence plane (Cubic root applied)



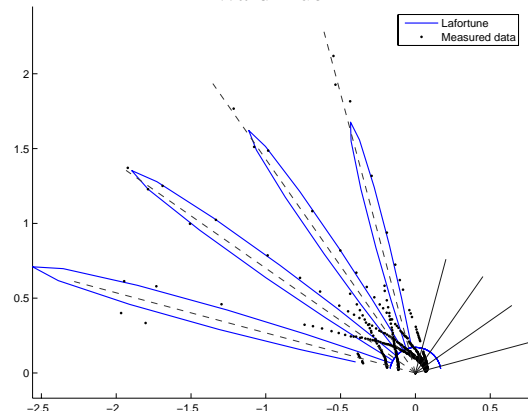
Ward



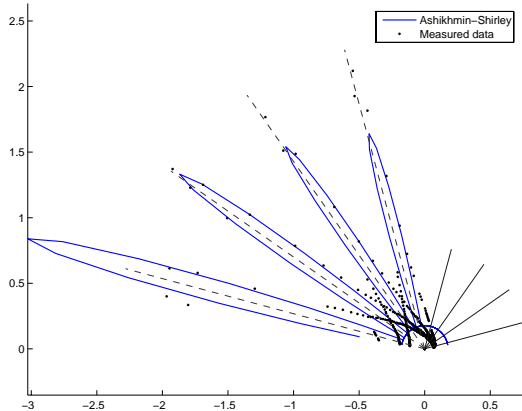
Ward-Duer



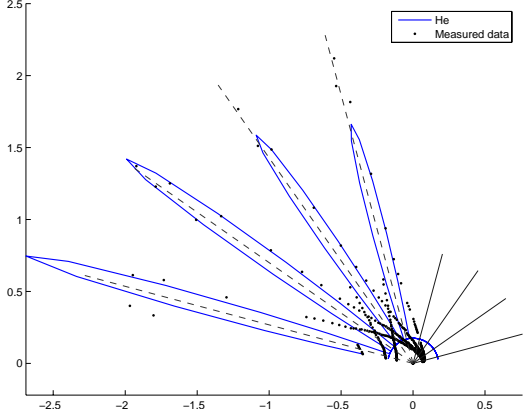
Cook-Torrance



Lafortune



Ashikhmin-Shirley



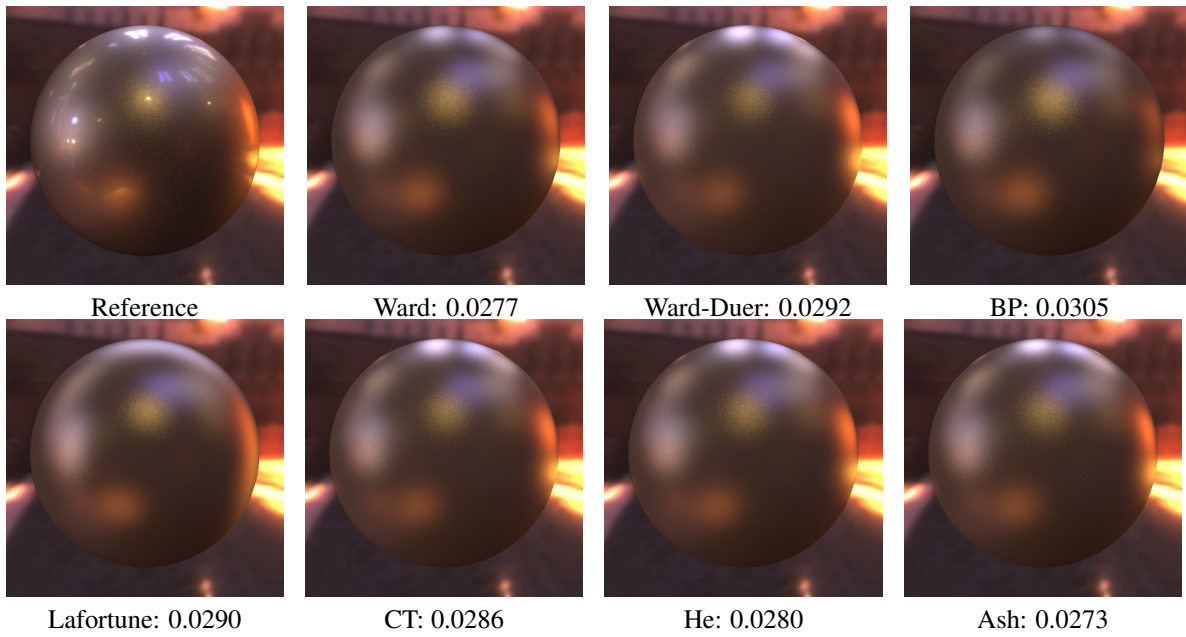
He

Material Name: ch-ball-gold-metallic2

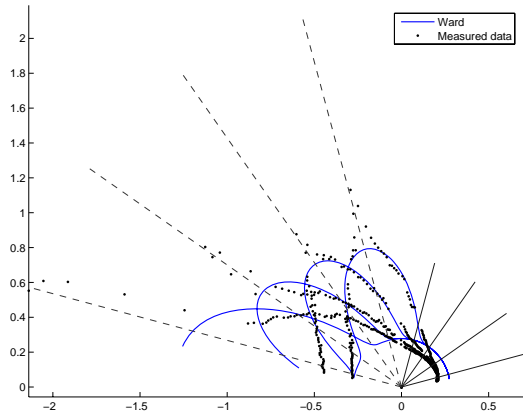
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.0651	0.0467	0.0232	0.149	0.111	0.0629	0.153			0.0277
Ward-Duer	0.0806	0.0581	0.0294	0.0864	0.0644	0.037	0.147			0.0292
Blinn-Phong	0.0633	0.0452	0.0226	0.0459	0.0342	0.0193	79.2			0.0305
Lafortune et al.	0.066	0.0474	0.0238	0.233	0.173	0.0978	-0.583	0.566	27.4	0.029
Cook-Torrance	0.0777	0.056	0.0282	0.142	0.106	0.0607	0.629	0.144		0.0286
He et al.	0.0719	0.0517	0.0258	0.229	0.17	0.0975	28	2.11	5.18	0.028
Ashikhmin-Shirley	0.072	0.0517	0.0257	0.107	0.0797	0.0458	0.999	80.1		0.0273

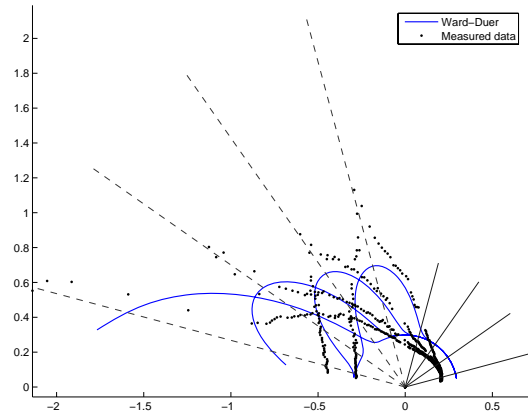
Rendered Images



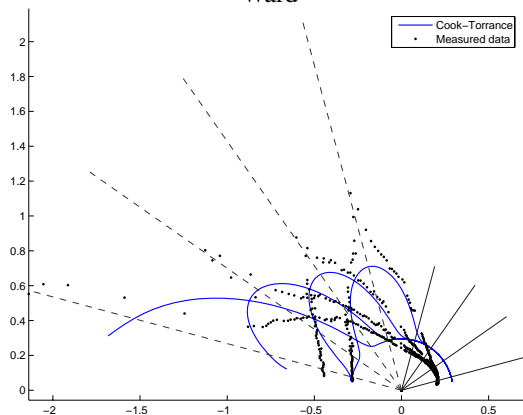
BRDF Plots in the incidence plane (Cubic root applied)



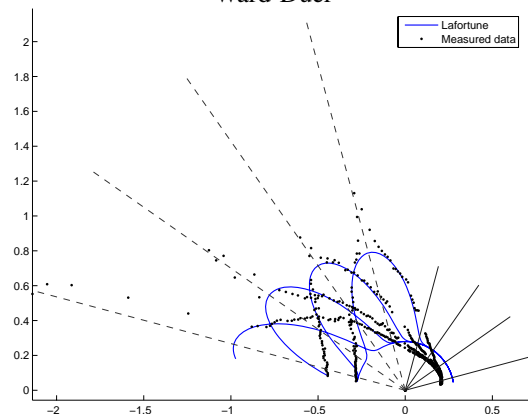
Ward



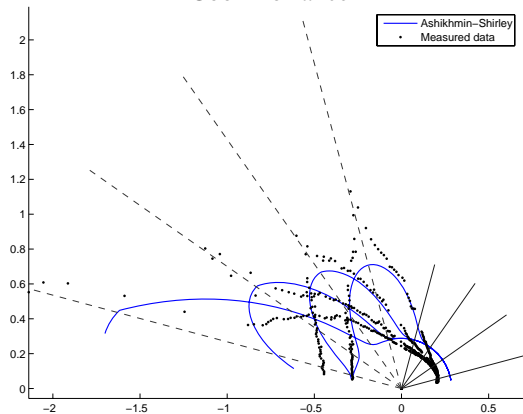
Ward-Duer



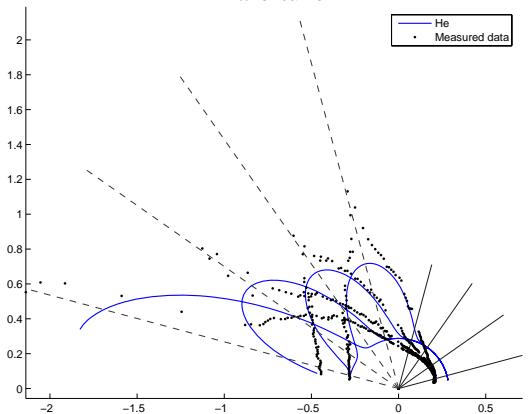
Cook-Torrance



Lafortune



Ashikhmin-Shirley



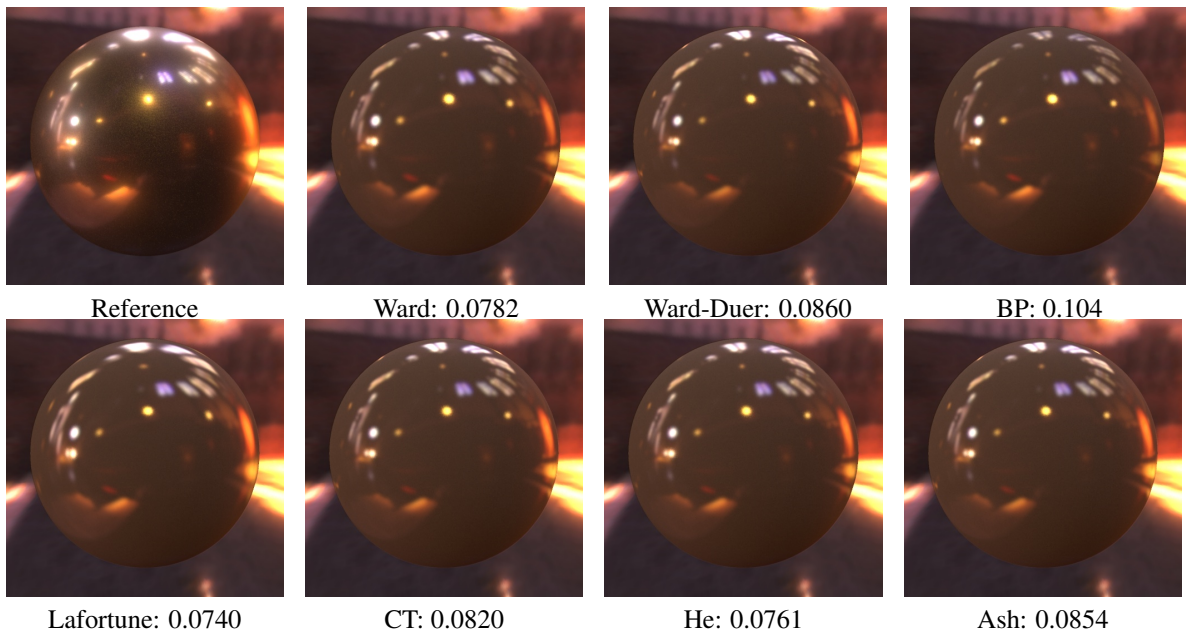
He

Material Name: ch-ball-gold-metallic

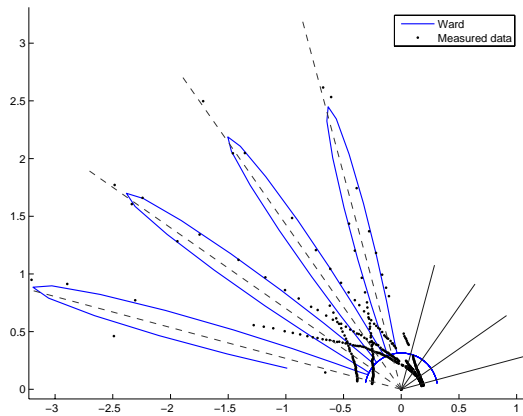
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.0949	0.0577	0.0207	0.106	0.069	0.0271	0.0229			0.0782
Ward-Duer	0.104	0.0633	0.0227	0.0533	0.0353	0.0144	0.0204			0.086
Blinn-Phong	0.1	0.0613	0.0223	0.0296	0.019	0.00728	4.94e+003			0.104
Lafortune et al.	0.0971	0.0591	0.0212	0.257	0.165	0.0656	-0.578	0.577	1.22e+003	0.074
Cook-Torrance	0.102	0.0619	0.0221	0.0951	0.0627	0.0254	0.635	0.0214		0.082
He et al.	0.101	0.0613	0.022	0.1	0.0651	0.026	28	0.304	9.09	0.0761
Ashikhmin-Shirley	0.104	0.0629	0.0225	0.0558	0.037	0.015	0.999	4.53e+003		0.0854

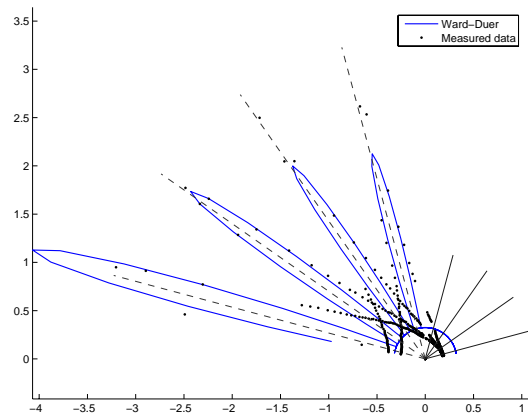
Rendered Images



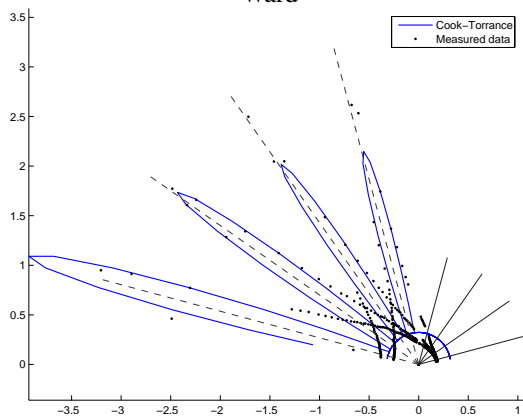
BRDF Plots in the incidence plane (Cubic root applied)



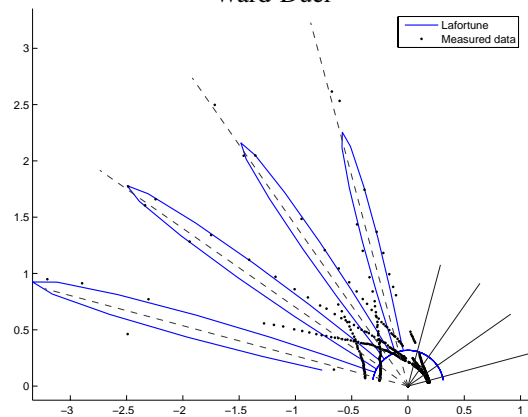
Ward



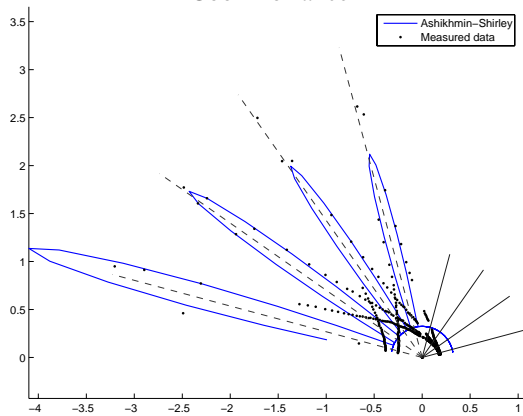
Ward-Duer



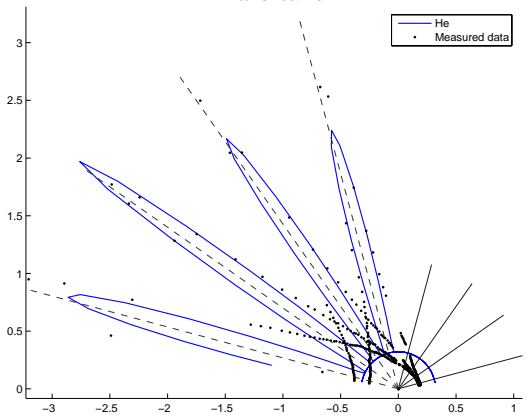
Cook-Torrance



Lafortune



Ashikhmin-Shirley



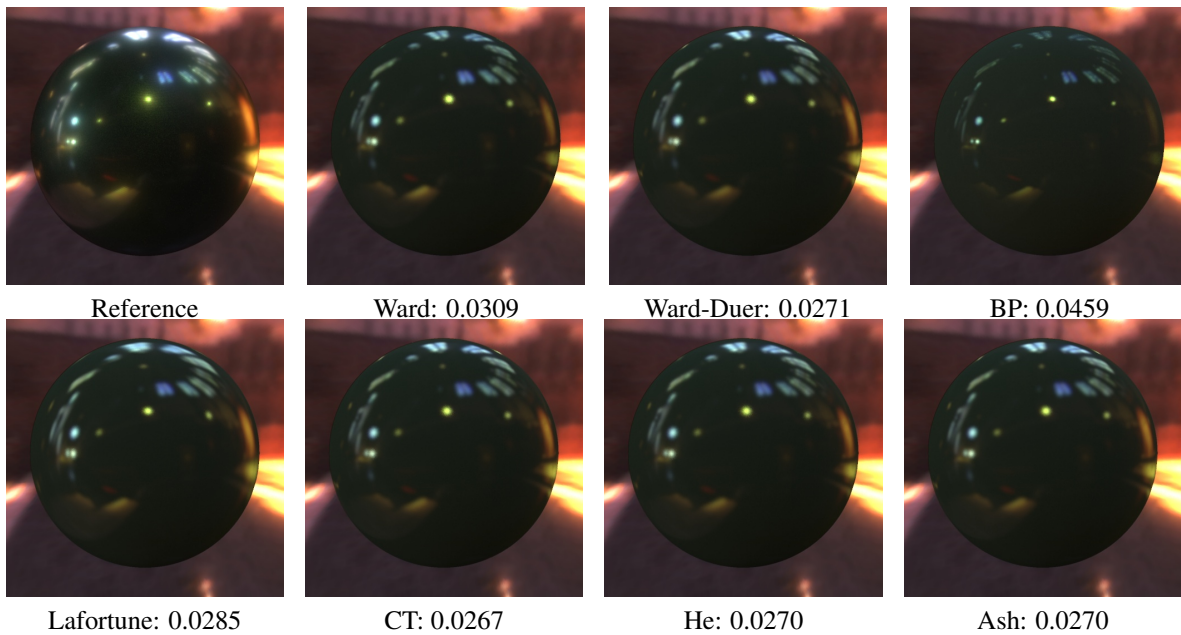
He

Material Name: ch-ball-green-metallic

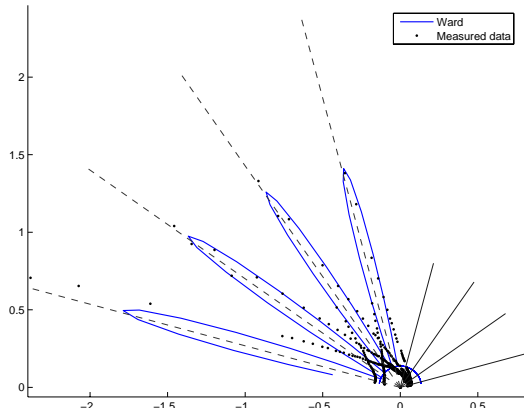
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.00769	0.0182	0.00679	0.0169	0.0307	0.0134	0.021			0.0309
Ward-Duer	0.00794	0.0199	0.00727	0.0115	0.019	0.00875	0.0218			0.0271
Blinn-Phong	0.0119	0.025	0.00997	0.00201	0.00428	0.00175	1.74e+004			0.0459
Lafortune et al.	0.0081	0.0195	0.00728	0.0499	0.0868	0.0385	-0.578	0.577	1.4e+003	0.0285
Cook-Torrance	0.00782	0.0197	0.00717	0.0262	0.0436	0.0199	0.456	0.0218		0.0267
He et al.	0.00773	0.0194	0.00708	0.0397	0.0663	0.0301	28.8	0.329	3.43	0.027
Ashikhmin-Shirley	0.00783	0.0197	0.00718	0.0119	0.0197	0.00905	0.999	4.08e+003		0.027

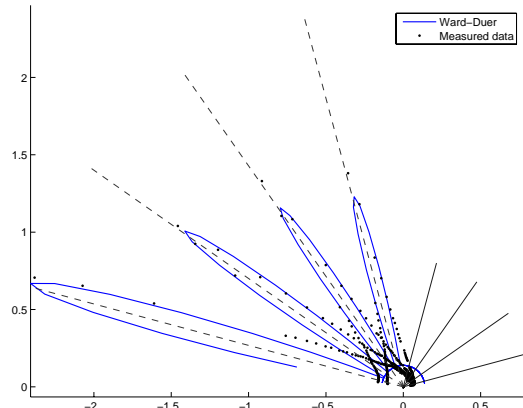
Rendered Images



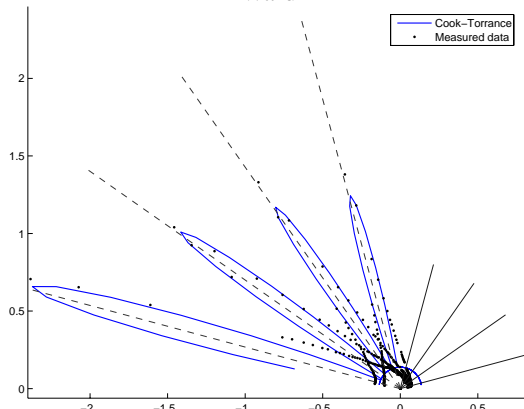
BRDF Plots in the incidence plane (Cubic root applied)



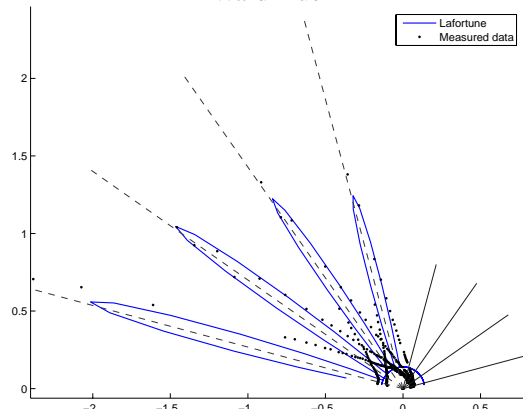
Ward



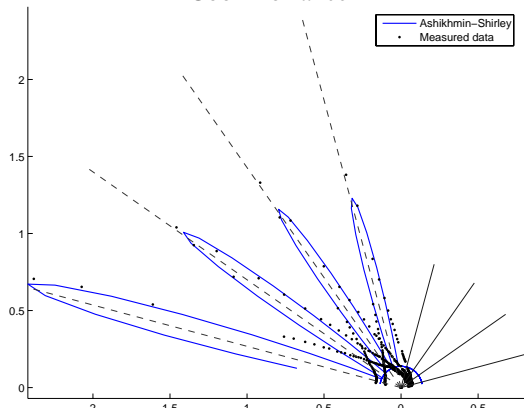
Ward-Duer



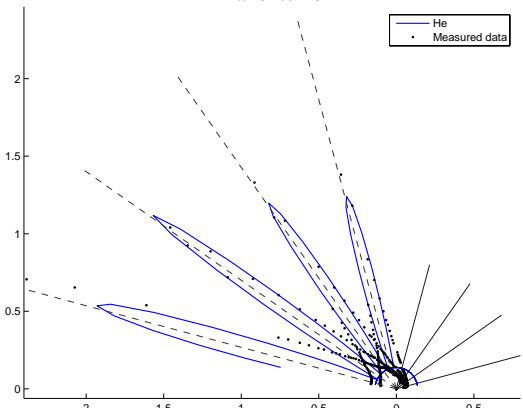
Cook-Torrance



Lafortune



Ashikhmin-Shirley



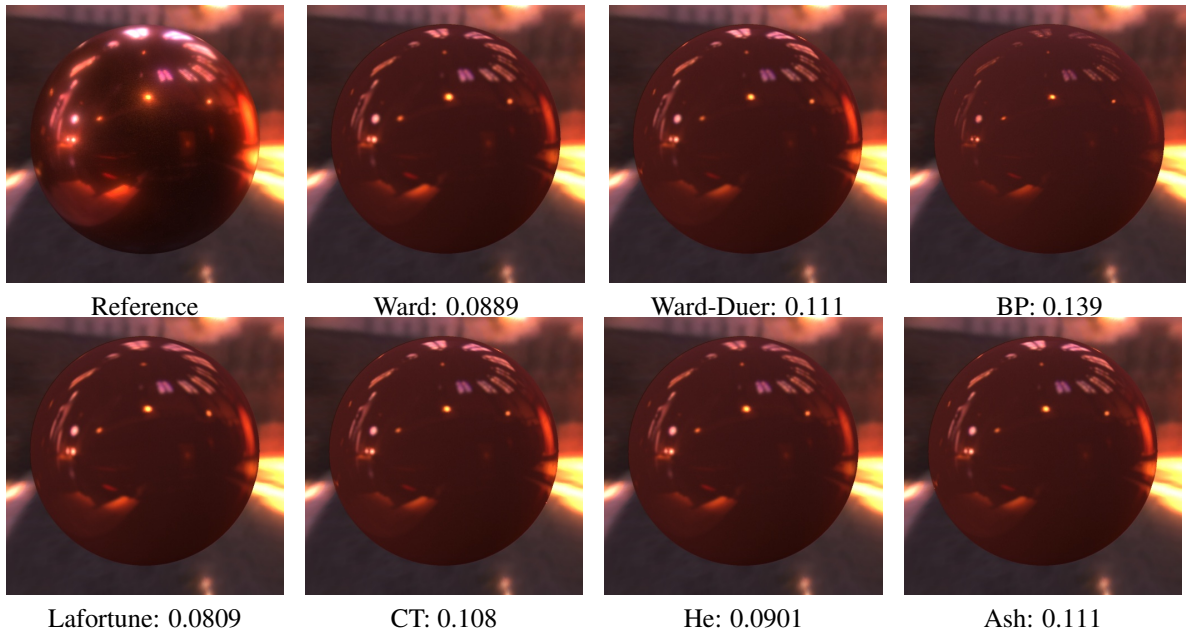
He

Material Name: ch-ball-red-metallic

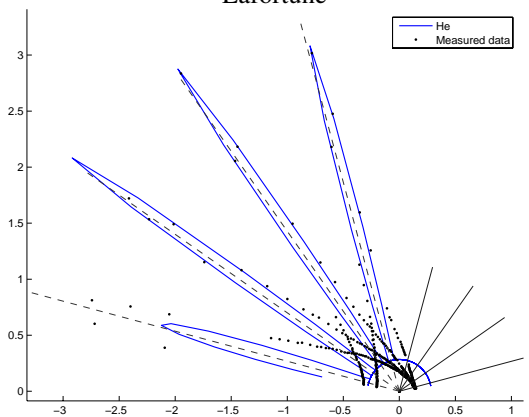
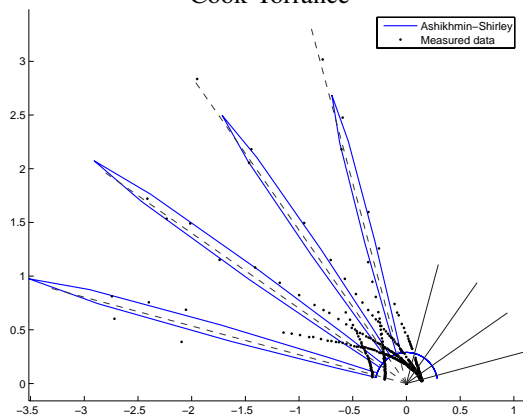
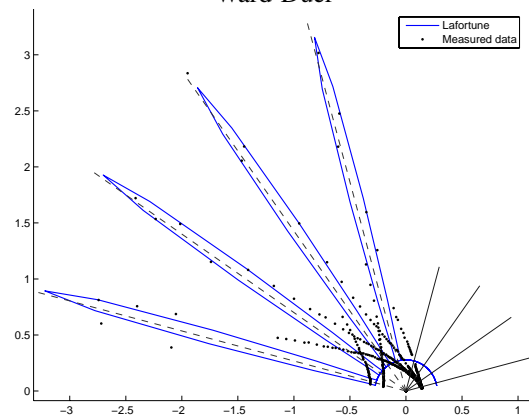
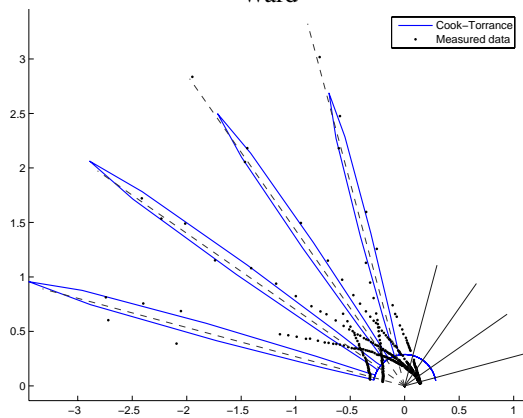
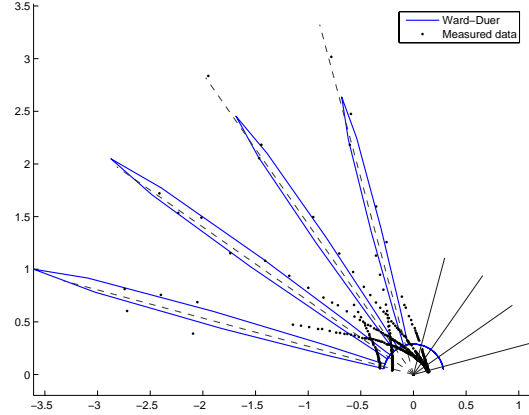
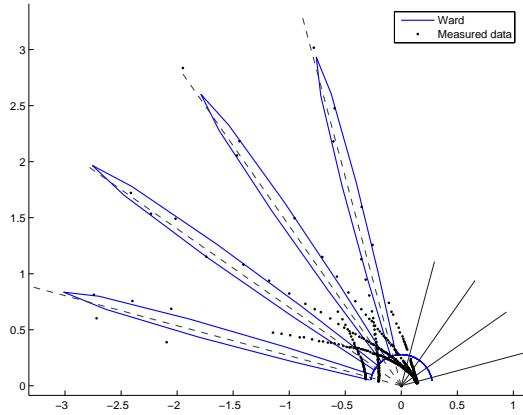
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.0652	0.0087	0.00489	0.0726	0.0137	0.00557	0.0144			0.0889
Ward-Duer	0.073	0.00975	0.00533	0.0378	0.00777	0.00338	0.0124			0.111
Blinn-Phong	0.0837	0.0128	0.00775	0.0096	0.00153	0.000535	4.29e+004			0.139
Lafortune et al.	0.0651	0.00888	0.0051	0.0899	0.0165	0.00654	-0.577	0.577	3.07e+003	0.0809
Cook-Torrance	0.0724	0.00971	0.00535	0.0651	0.0132	0.00567	0.611	0.0123		0.108
He et al.	0.0693	0.00959	0.00552	0.0795	0.0148	0.00591	29.4	0.188	8.88	0.0901
Ashikhmin-Shirley	0.0736	0.00993	0.00548	0.0369	0.00752	0.00325	0.999	1.42e+004		0.111

Rendered Images



BRDF Plots in the incidence plane (Cubic root applied)

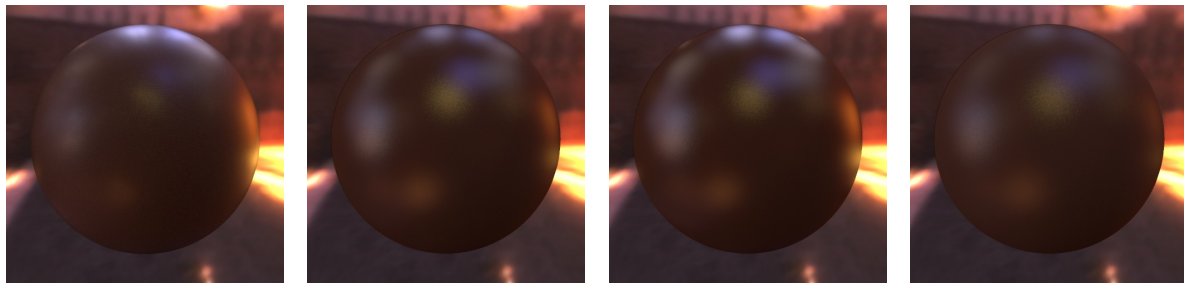


Material Name: cherry-235

Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.0395	0.0135	0.00468	0.0346	0.0298	0.0206	0.133			0.0196
Ward-Duer	0.0377	0.0118	0.00339	0.0258	0.0223	0.0156	0.129			0.0135
Blinn-Phong	0.0432	0.0167	0.00699	0.0092	0.00786	0.00539	82.1			0.0222
Lafortune et al.	0.0546	0.0264	0.0136	0.367	0.319	0.223	-0.599	0.532	112	0.0127
Cook-Torrance	0.0464	0.0193	0.00853	0.2	0.174	0.122	0.0441	0.139		0.00569
He et al.	0.0469	0.0197	0.00884	0.32	0.277	0.195	15.9	1.16	1.37	0.00565
Ashikhmin-Shirley	0.0444	0.0175	0.00732	0.258	0.224	0.157	0.0558	84.4		0.00541

Rendered Images

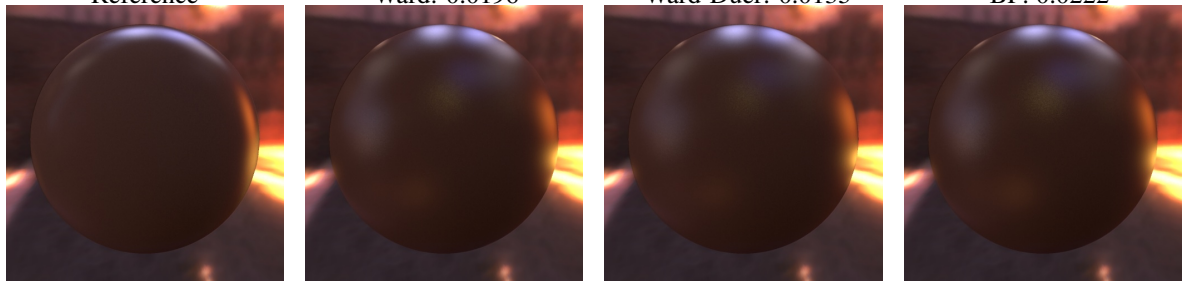


Reference

Ward: 0.0196

Ward-Duer: 0.0135

BP: 0.0222



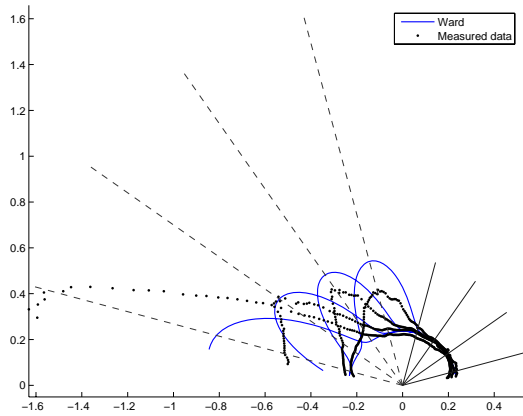
Lafortune: 0.0127

CT: 0.00569

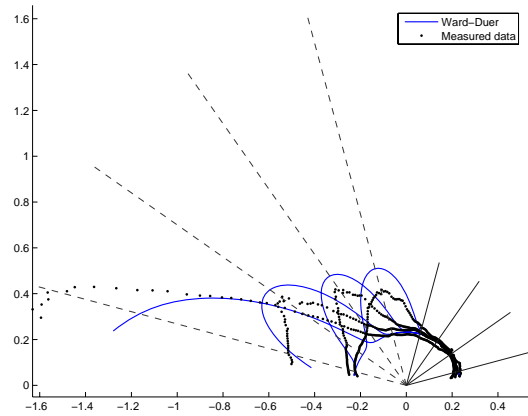
He: 0.00565

Ash: 0.00541

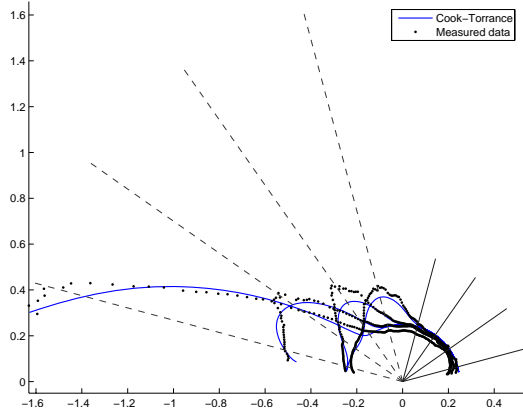
BRDF Plots in the incidence plane (Cubic root applied)



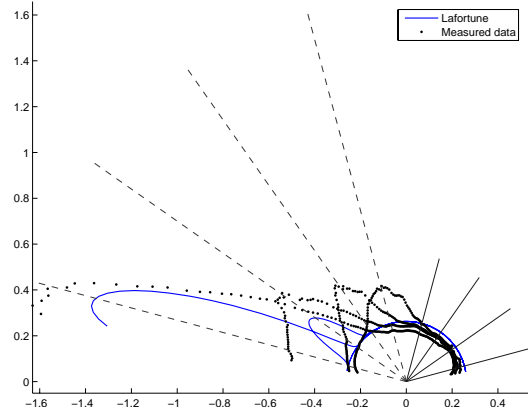
Ward



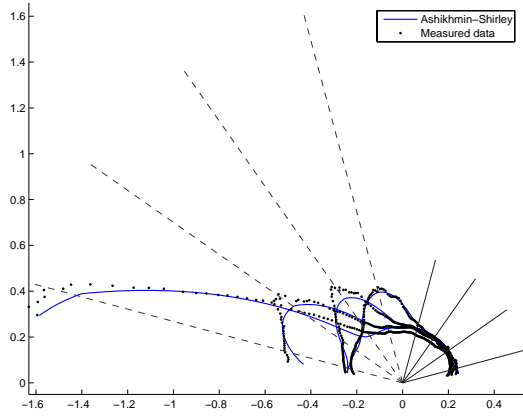
Ward-Duer



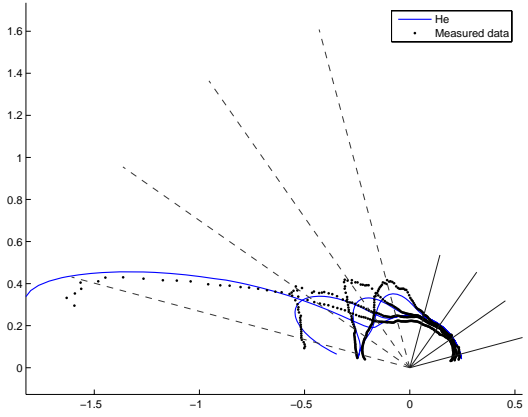
Cook-Torrance



Lafortune



Ashikhmin-Shirley



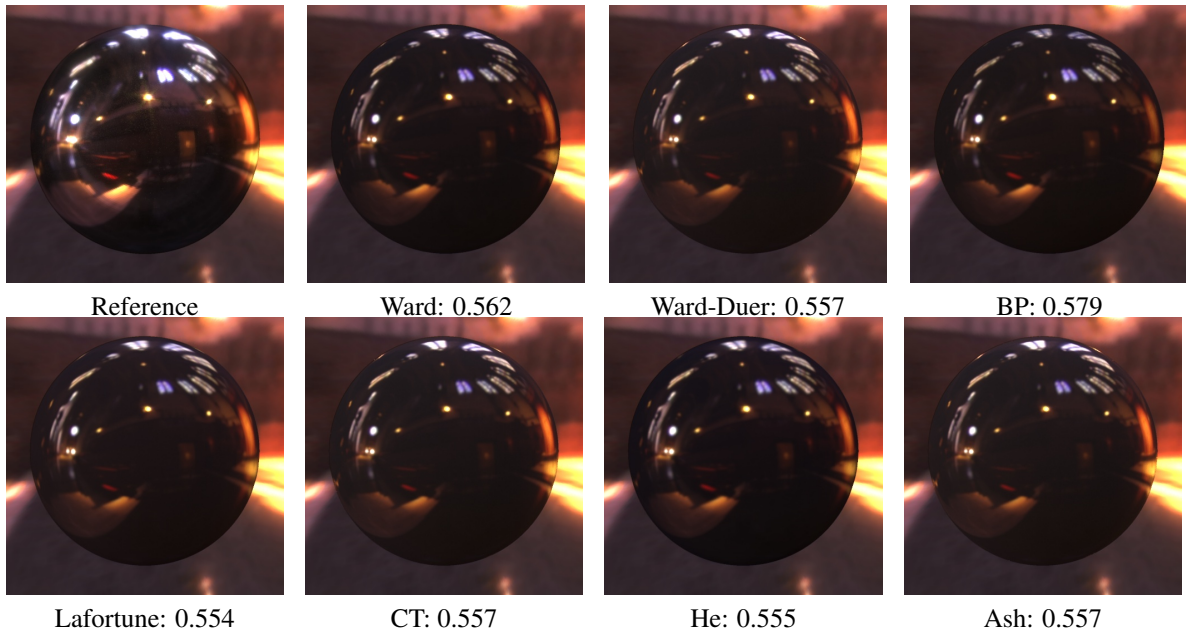
He

Material Name: chrome

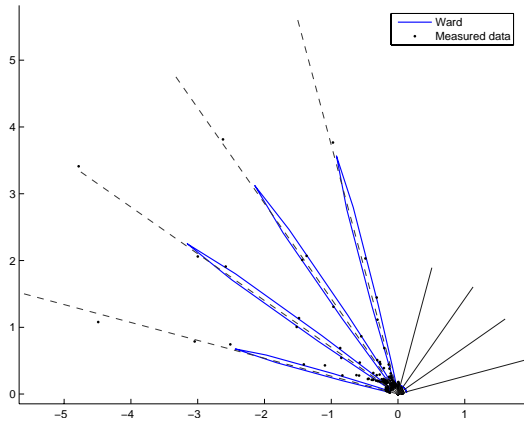
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.00651	0.00546	0.00498	0.0649	0.0458	0.0226	0.0101			0.562
Ward-Duer	0.0116	0.00999	0.00798	0.0423	0.0295	0.0141	0.00934			0.557
Blinn-Phong	0.00817	0.0063	0.00474	0.0213	0.0151	0.00766	1.79e+004			0.579
Lafortune et al.	0.0106	0.00755	0.00681	0.104	0.0749	0.0355	-0.577	0.577	6.63e+003	0.554
Cook-Torrance	0.0116	0.00995	0.00796	0.0428	0.0298	0.0143	0.991	0.00935		0.557
He et al.	0.0042	0.00343	0.00455	0.0841	0.0596	0.0286	37.6	0.205	8.95	0.555
Ashikhmin-Shirley	0.0124	0.0105	0.00829	0.0815	0.0568	0.0272	0.509	2.34e+004		0.557

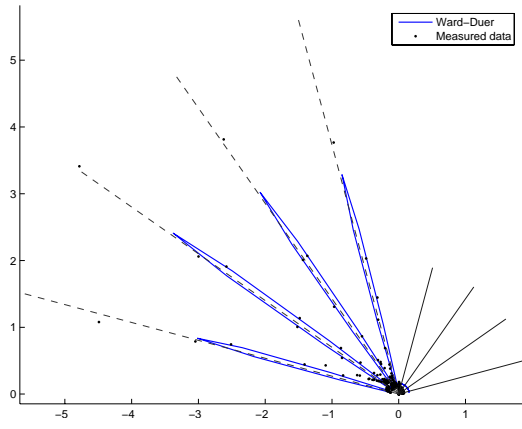
Rendered Images



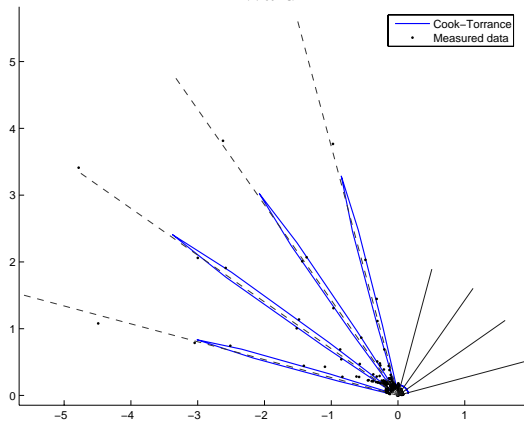
BRDF Plots in the incidence plane (Cubic root applied)



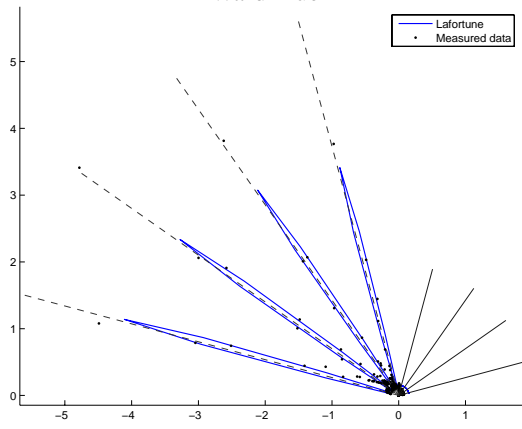
Ward



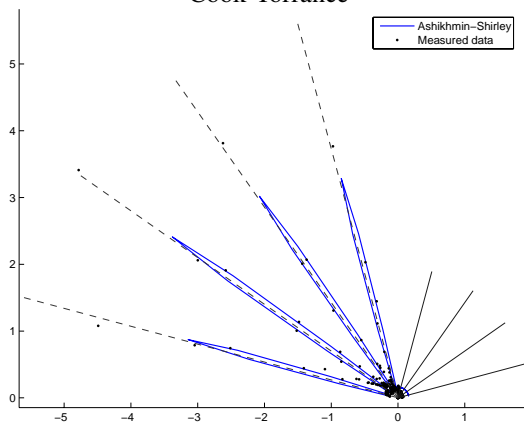
Ward-Duer



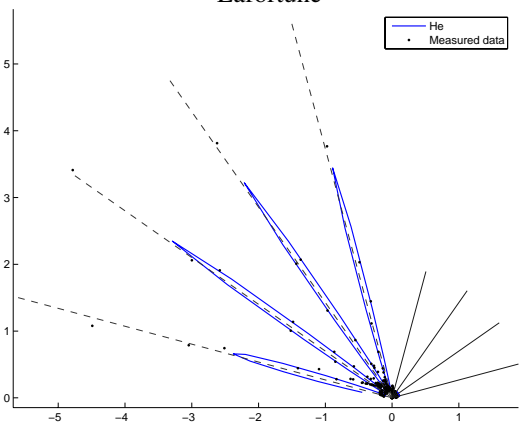
Cook-Torrance



Lafortune



Ashikhmin-Shirley



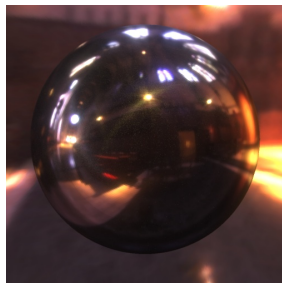
He

Material Name: chrome-steel

Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.0274	0.0245	0.02	0.074	0.0538	0.0276	0.00783			0.397
Ward-Duer	0.0353	0.0305	0.0248	0.0491	0.0361	0.0178	0.00711			0.402
Blinn-Phong	0.0299	0.0273	0.0196	0.0235	0.0169	0.00922	3.17e+004			0.425
Lafortune et al.	0.0263	0.0236	0.0184	0.0763	0.0557	0.0293	-0.577	0.577	9.16e+003	0.414
Cook-Torrance	0.0344	0.0298	0.0243	0.0833	0.0613	0.0302	0.608	0.00718		0.4
He et al.	0.0316	0.0275	0.0229	0.0818	0.0601	0.0298	103	0.384	9.1	0.391
Ashikhmin-Shirley	0.0356	0.0308	0.0249	0.049	0.0361	0.0178	0.999	3.98e+004		0.402

Rendered Images



Reference



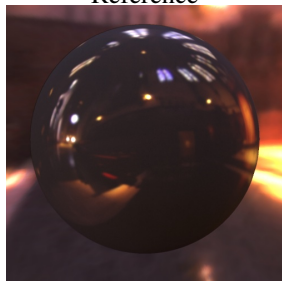
Ward: 0.397



Ward-Duer: 0.402



BP: 0.425



Lafortune: 0.414



CT: 0.400

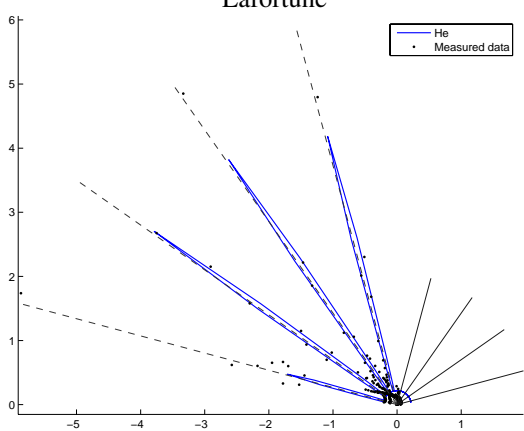
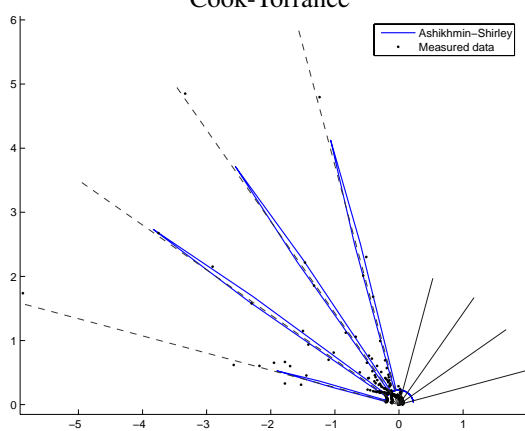
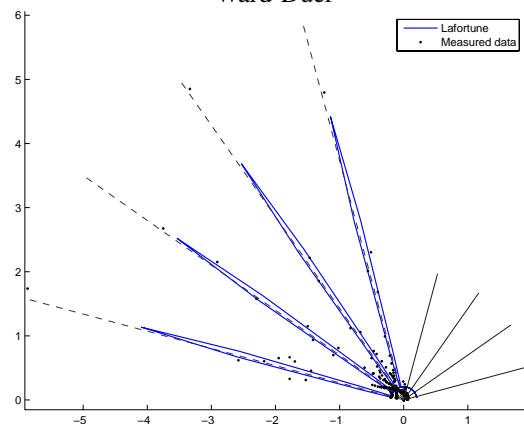
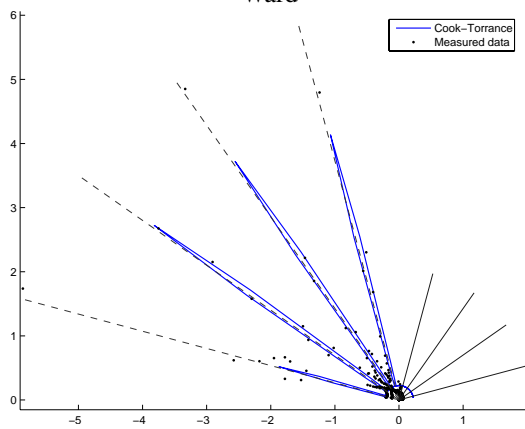
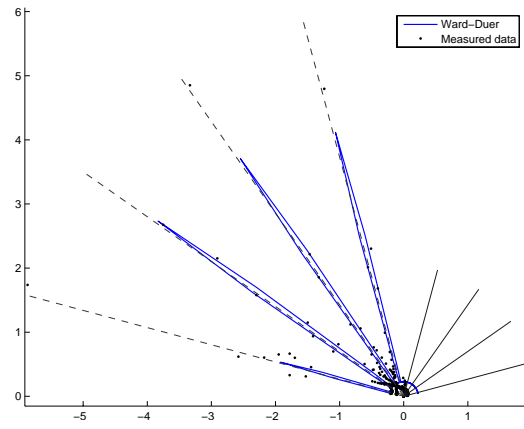
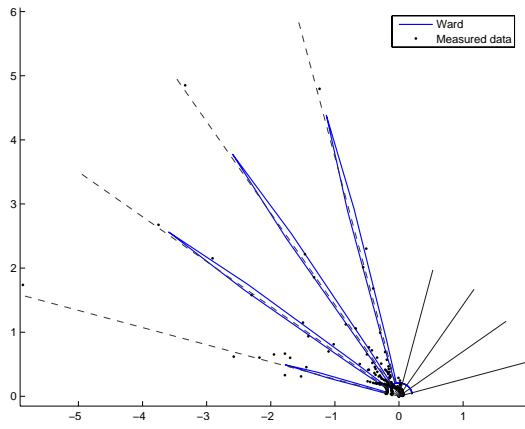


He: 0.391



Ash: 0.402

BRDF Plots in the incidence plane (Cubic root applied)

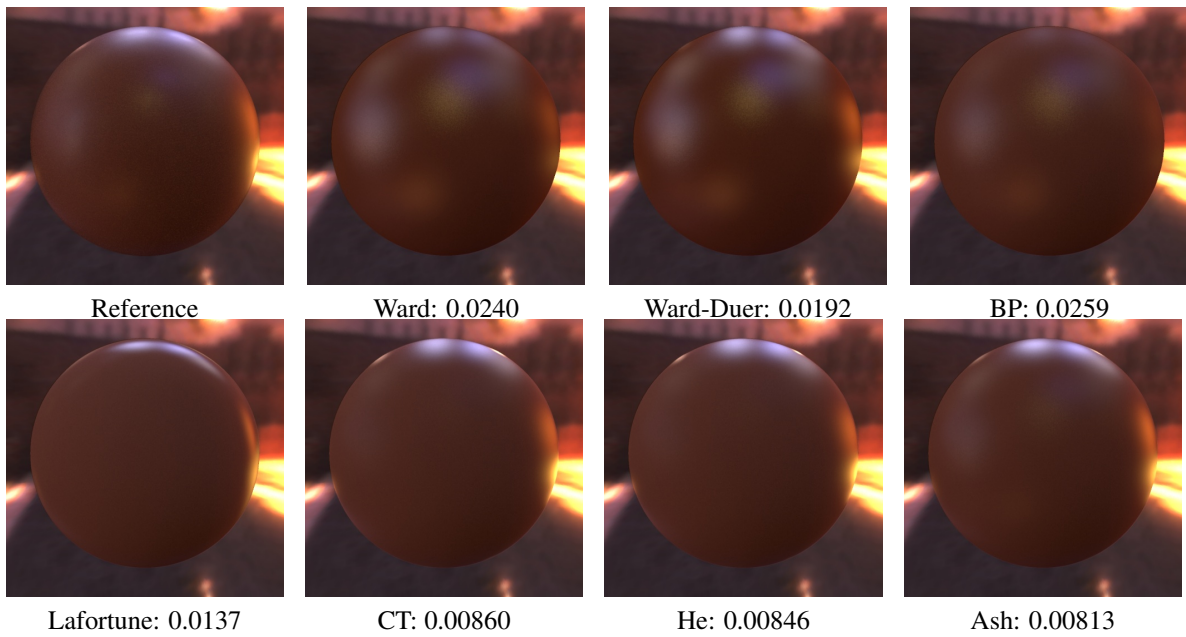


Material Name: colonial-maple-223

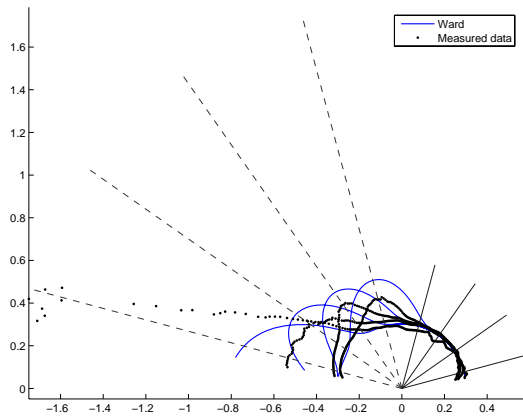
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.0837	0.0201	0.00481	0.0436	0.0357	0.0241	0.177			0.024
Ward-Duer	0.082	0.0181	0.00354	0.0315	0.0265	0.0178	0.158			0.0192
Blinn-Phong	0.0916	0.027	0.00942	0.00946	0.00753	0.00509	62.7			0.0259
Lafortune et al.	0.105	0.0378	0.0168	0.774	0.67	0.445	-0.605	0.517	161	0.0137
Cook-Torrance	0.101	0.0339	0.0141	0.981	0.851	0.566	0.00173	0.166		0.0086
He et al.	0.101	0.0339	0.0141	2.31	2.01	1.33	28.1	2.41	1.06	0.00846
Ashikhmin-Shirley	0.0955	0.0293	0.011	0.408	0.352	0.234	0.0218	63.3		0.00813

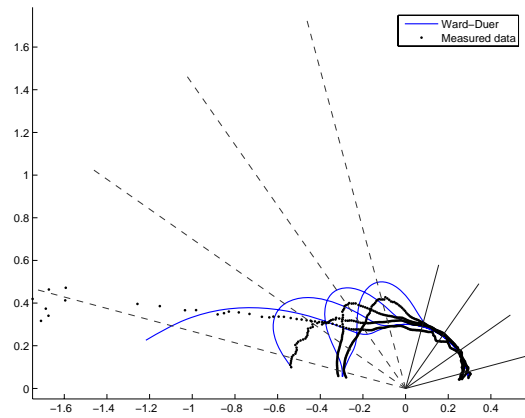
Rendered Images



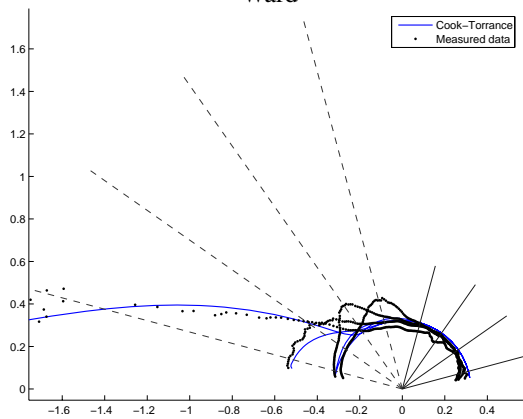
BRDF Plots in the incidence plane (Cubic root applied)



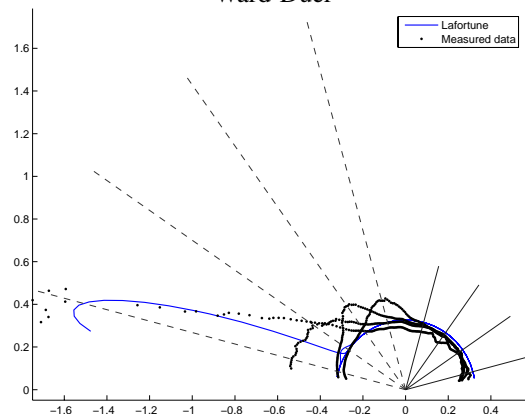
Ward



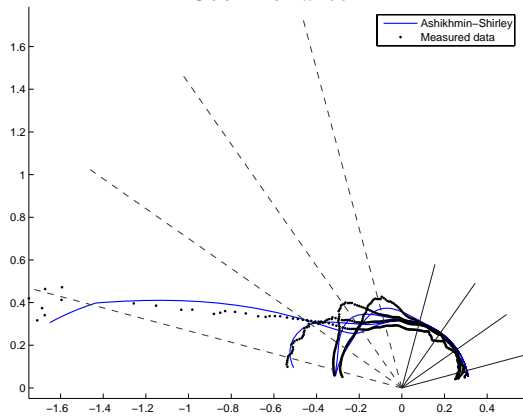
Ward-Duer



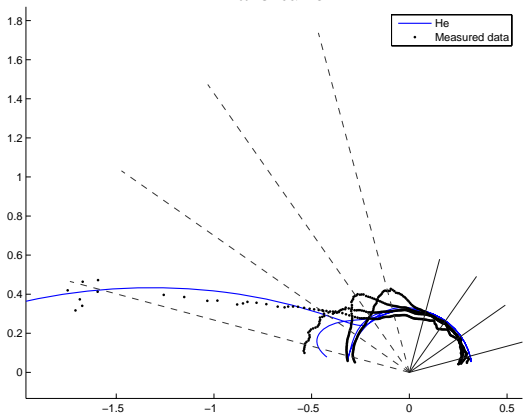
Cook-Torrance



Lafortune



Ashikhmin-Shirley



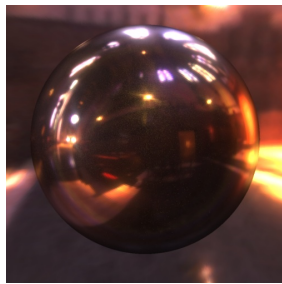
He

Material Name: copper

Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.063	0.0342	0.0246	0.257	0.149	0.0674	0.00779			0.657
Ward-Duer	0.0697	0.0374	0.027	0.185	0.109	0.0476	0.00732			0.554
Blinn-Phong	0.0749	0.0414	0.027	0.0756	0.0437	0.0202	3.32e+004			0.808
Lafortune et al.	0.0735	0.0393	0.0275	0.294	0.173	0.0768	-0.577	0.577	1.14e+004	0.639
Cook-Torrance	0.0721	0.0387	0.0277	0.183	0.107	0.0471	0.999	0.00719		0.555
He et al.	0.0592	0.0317	0.0242	0.309	0.18	0.0798	79.7	0.317	9.58	0.568
Ashikhmin-Shirley	0.0759	0.0407	0.0286	1.04	0.609	0.266	0.166	4.08e+004		0.548

Rendered Images



Reference



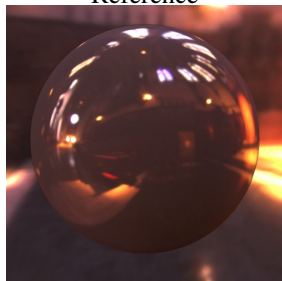
Ward: 0.657



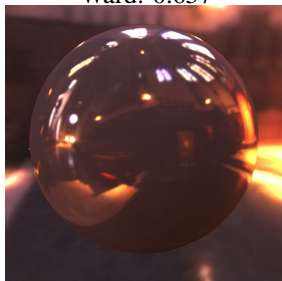
Ward-Duer: 0.554



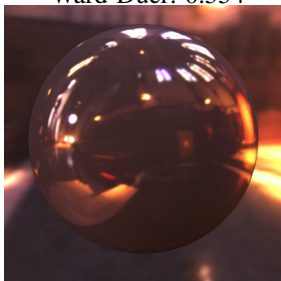
BP: 0.808



Lafortune: 0.639



CT: 0.555

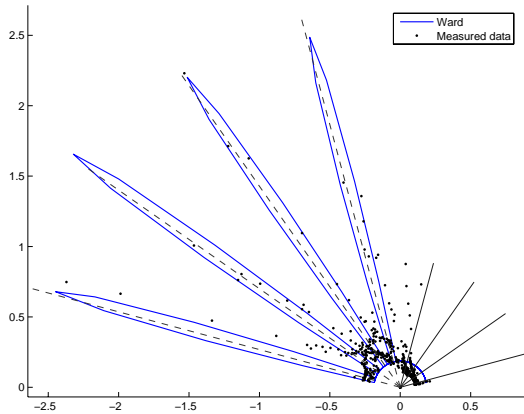


He: 0.568

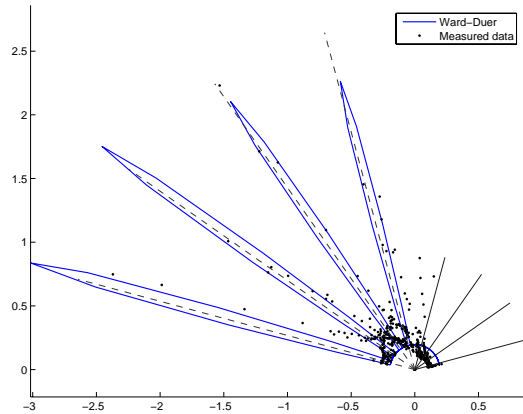


Ash: 0.548

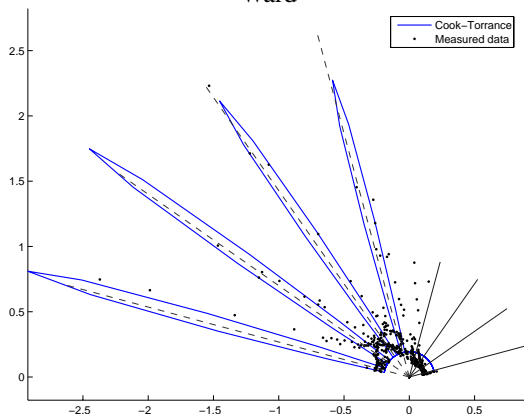
BRDF Plots in the incidence plane (Cubic root applied)



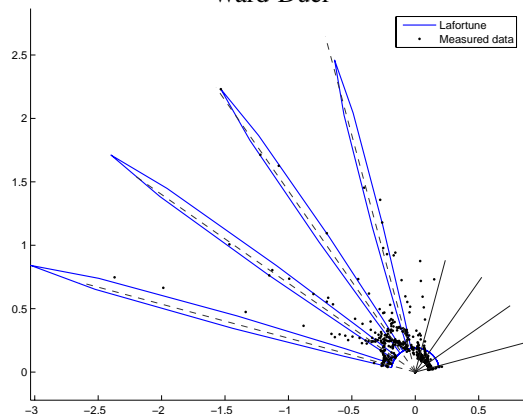
Ward



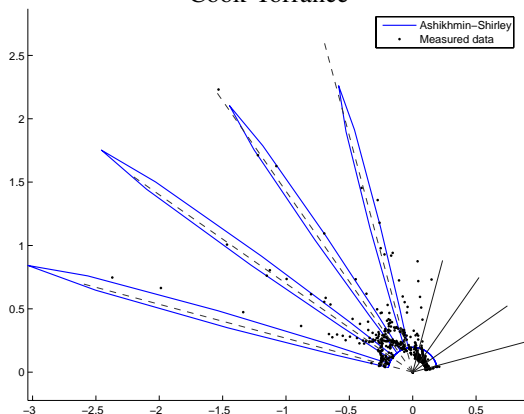
Ward-Duer



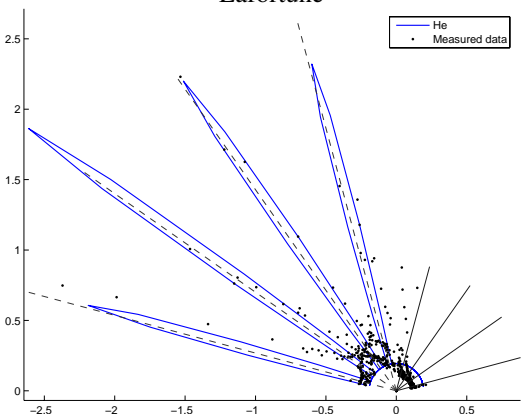
Cook-Torrance



Lafortune



Ashikhmin-Shirley



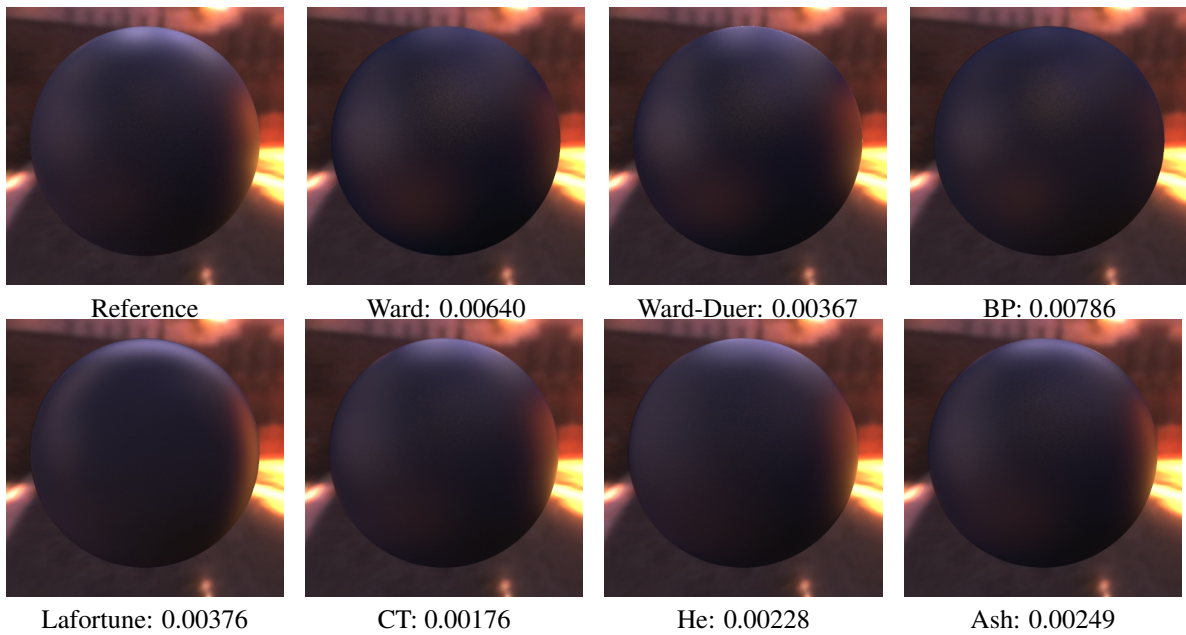
He

Material Name: dark-blue-paint

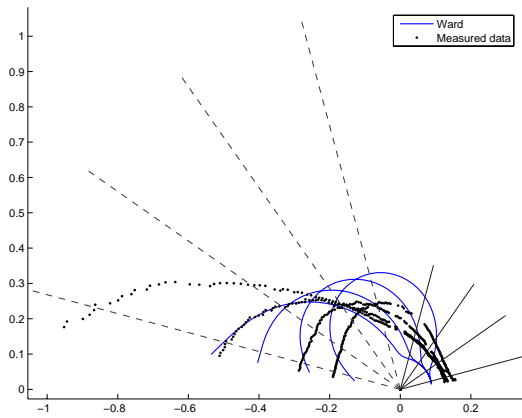
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.00212	0.00698	0.0215	0.0446	0.0318	0.0227	0.316			0.0064
Ward-Duer	0.00312	0.00744	0.0219	0.0278	0.0202	0.0143	0.288			0.00367
Blinn-Phong	0.012	0.0143	0.0267	0.0074	0.00513	0.00364	31.3			0.00786
Lafortune et al.	0.0171	0.0175	0.029	0.178	0.132	0.0927	-0.633	0.446	20.4	0.00376
Cook-Torrance	0.00833	0.0111	0.0245	0.151	0.111	0.0778	0.0964	0.292		0.00176
He et al.	0.00563	0.00899	0.023	0.566	0.418	0.295	27.7	5.42	1.44	0.00228
Ashikhmin-Shirley	0.00511	0.00877	0.0229	0.217	0.159	0.111	0.122	16.9		0.00249

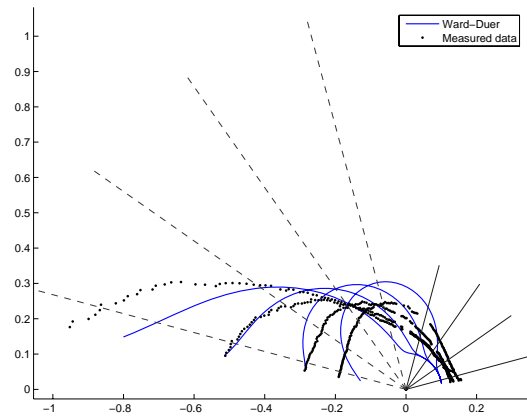
Rendered Images



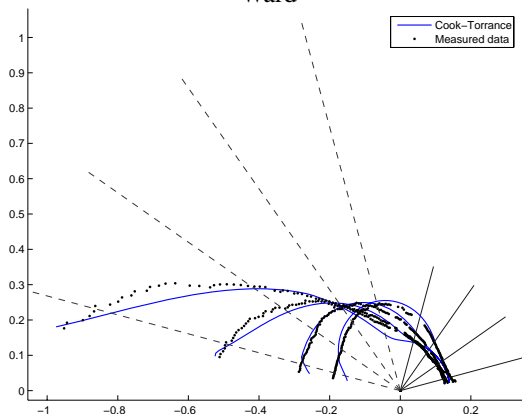
BRDF Plots in the incidence plane (Cubic root applied)



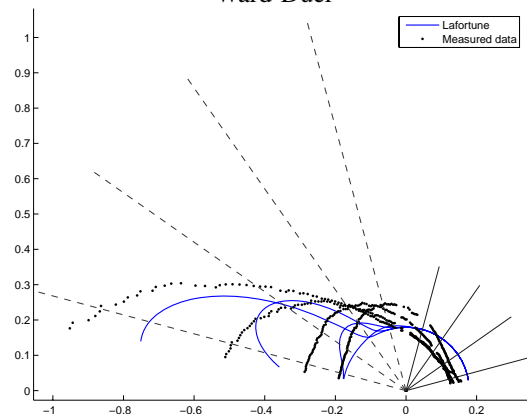
Ward



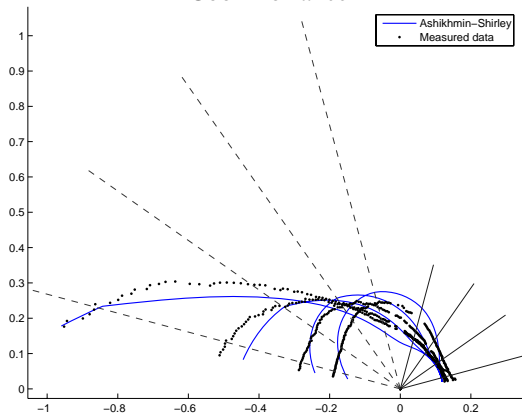
Ward-Duer



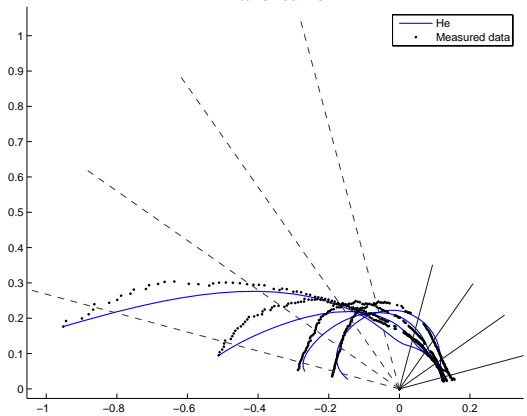
Cook-Torrance



Lafortune



Ashikhmin-Shirley



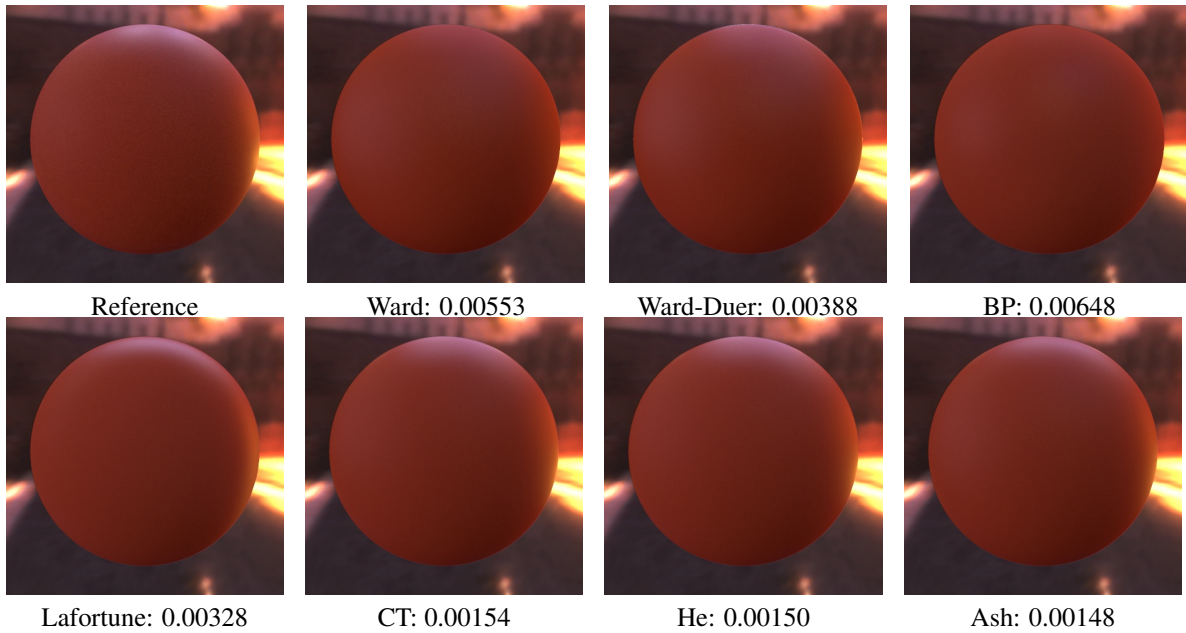
He

Material Name: dark-red-paint

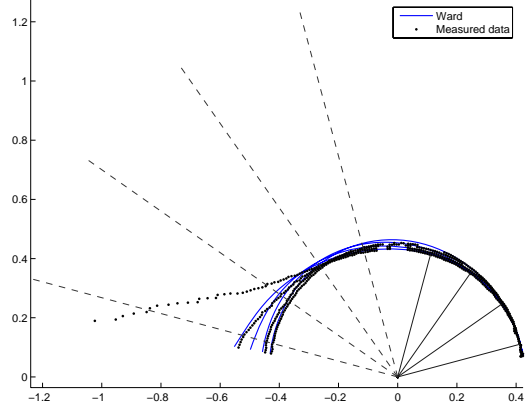
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.242	0.0244	0.00338	0.0477	0.0312	0.0221	0.419			0.00553
Ward-Duer	0.245	0.025	0.00418	0.0259	0.0185	0.0125	0.35			0.00388
Blinn-Phong	0.256	0.0341	0.0102	0.00473	0.00271	0.00194	34.1			0.00648
Lafortune et al.	0.26	0.0361	0.0118	0.223	0.169	0.109	-0.656	0.372	24.8	0.00328
Cook-Torrance	0.253	0.0308	0.00838	0.185	0.138	0.09	0.0405	0.329		0.00154
He et al.	0.254	0.0314	0.00876	0.584	0.437	0.284	15.9	2.88	1.24	0.0015
Ashikhmin-Shirley	0.25	0.0289	0.00709	0.272	0.2	0.13	0.0629	13.3		0.00148

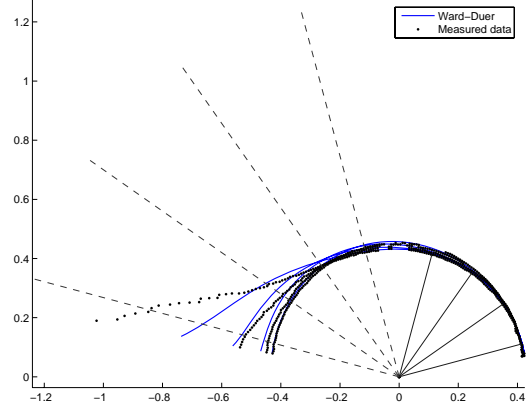
Rendered Images



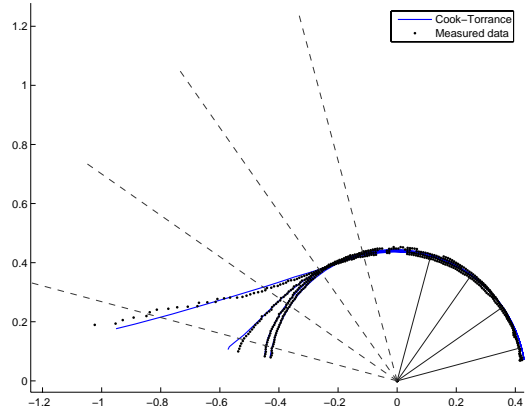
BRDF Plots in the incidence plane (Cubic root applied)



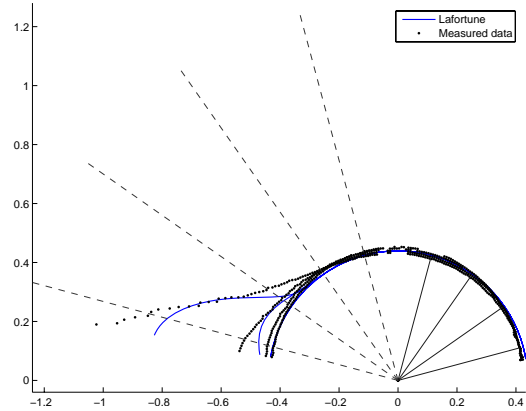
Ward



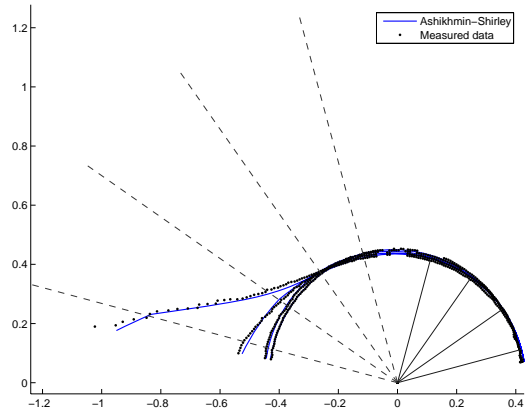
Ward-Duer



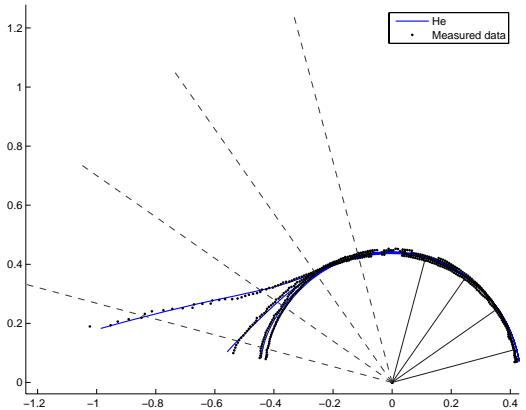
Cook-Torrance



Lafortune



Ashikhmin-Shirley



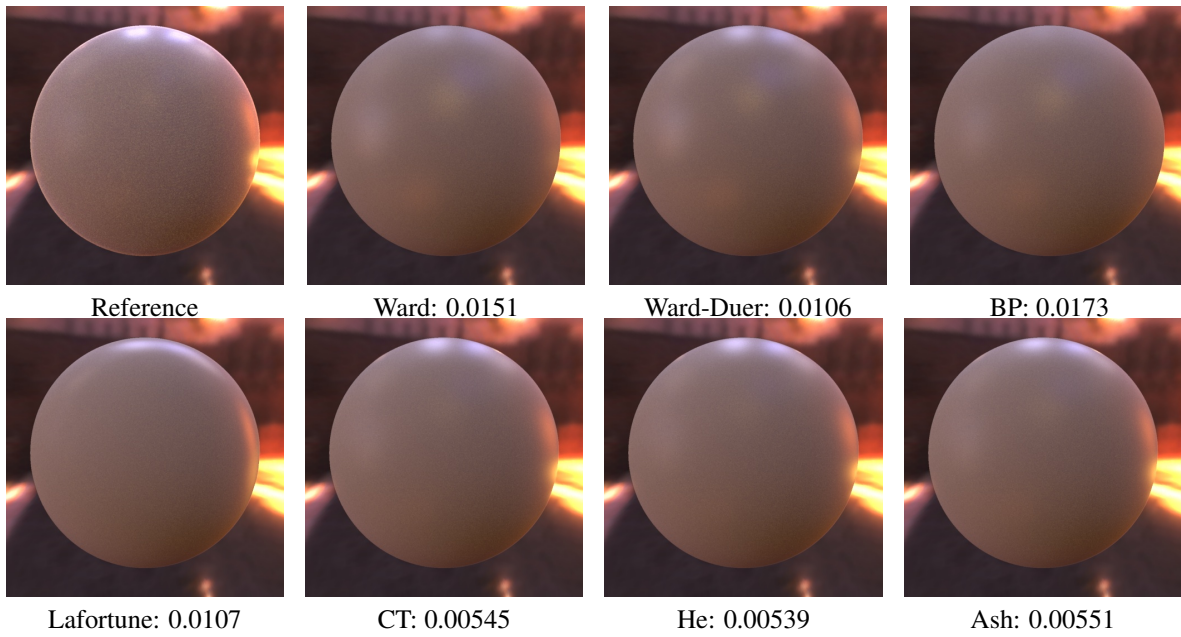
He

Material Name: delrin

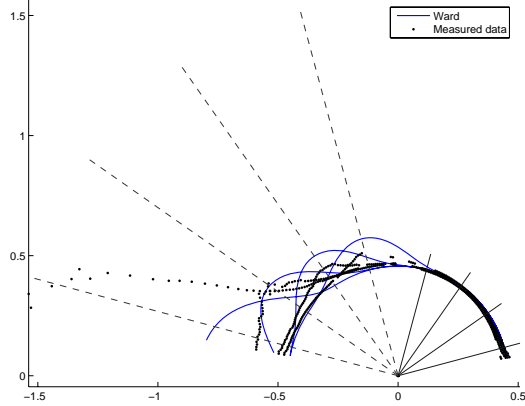
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.293	0.244	0.146	0.0348	0.0295	0.0202	0.162			0.0151
Ward-Duer	0.292	0.244	0.146	0.0238	0.0198	0.0133	0.146			0.0106
Blinn-Phong	0.299	0.249	0.15	0.00755	0.00654	0.00461	83.4			0.0173
Lafortune et al.	0.307	0.256	0.155	0.255	0.21	0.139	-0.598	0.534	97.3	0.0107
Cook-Torrance	0.3	0.251	0.151	0.162	0.135	0.0891	0.052	0.143		0.00545
He et al.	0.301	0.251	0.151	0.235	0.196	0.129	28	2.01	1.46	0.00539
Ashikhmin-Shirley	0.299	0.249	0.15	0.211	0.176	0.116	0.0633	80.6		0.00551

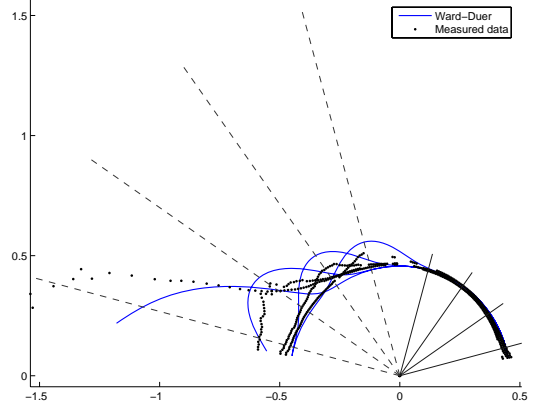
Rendered Images



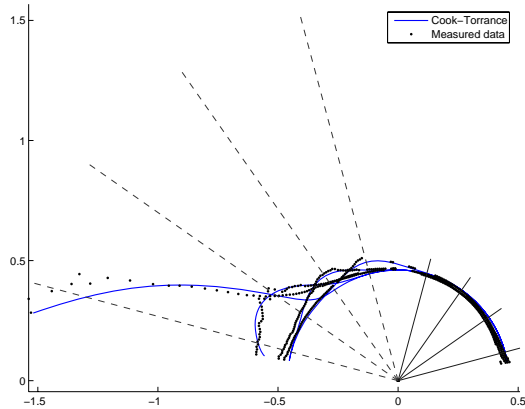
BRDF Plots in the incidence plane (Cubic root applied)



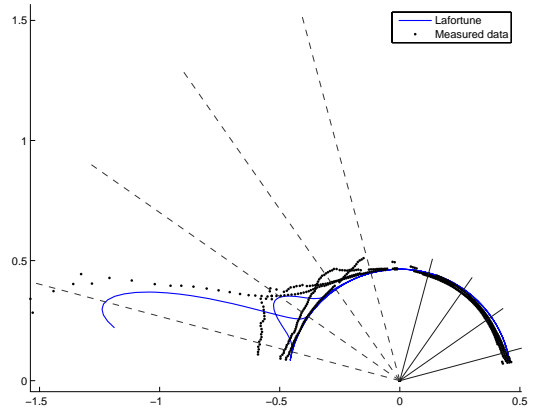
Ward



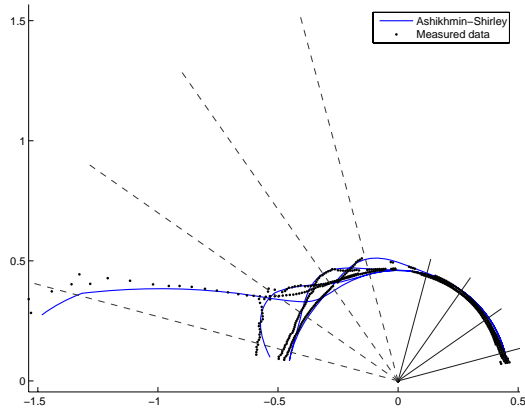
Ward-Duer



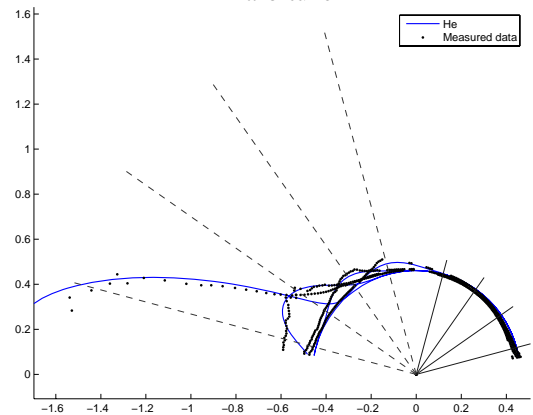
Cook-Torrance



Lafortune



Ashikhmin-Shirley



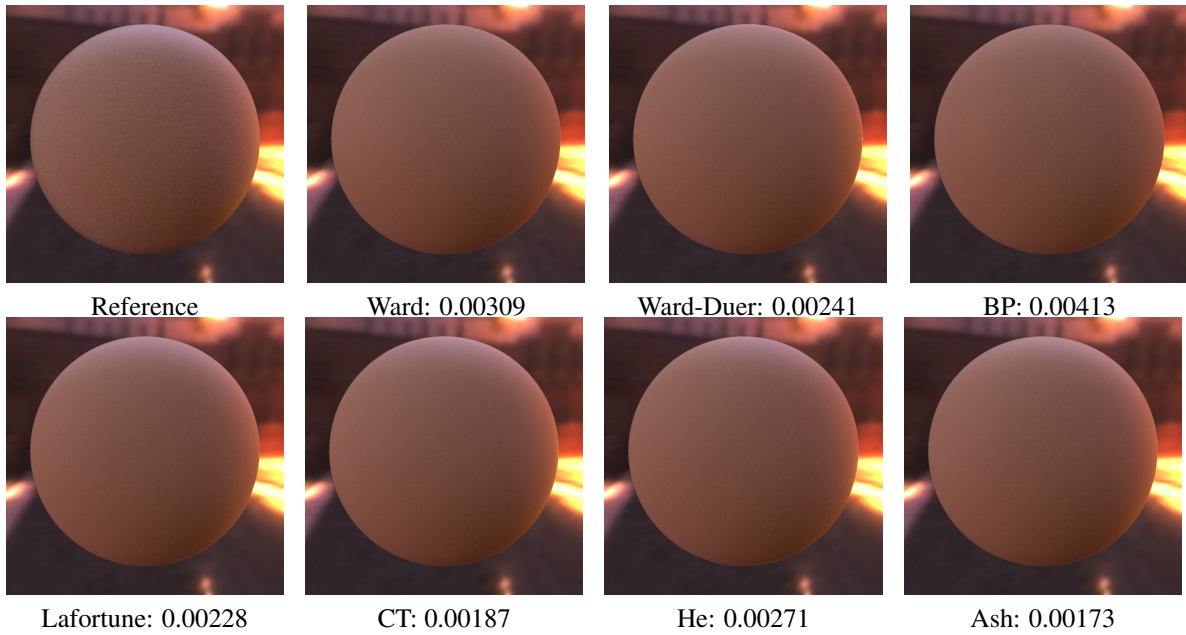
He

Material Name: fabric-4

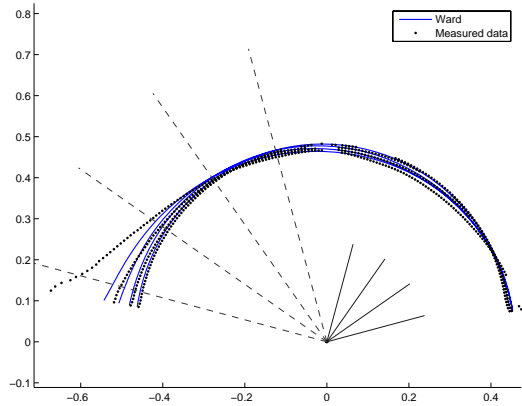
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.296	0.172	0.0838	0.0502	0.0279	0.00904	0.5			0.00309
Ward-Duer	0.299	0.172	0.0819	0.0285	0.0181	0.00884	0.5			0.00241
Blinn-Phong	0.314	0.183	0.0874	0.00149	0.000803	0.000127	89.3			0.00413
Lafortune et al.	0.31	0.179	0.0844	0.128	0.0934	0.0594	-0.707	3.09e-008	4.12	0.00228
Cook-Torrance	0.296	0.17	0.0799	0.15	0.1	0.0561	0.148	0.585		0.00187
He et al.	0.311	0.18	0.0849	0.311	0.218	0.128	20	4	1.3	0.00271
Ashikhmin-Shirley	0.283	0.162	0.0752	0.167	0.11	0.0608	0.467	2.53		0.00173

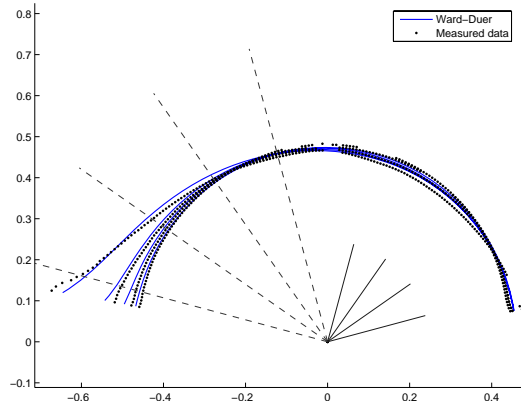
Rendered Images



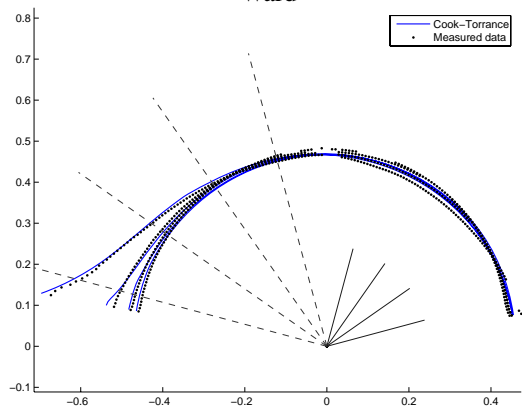
BRDF Plots in the incidence plane (Cubic root applied)



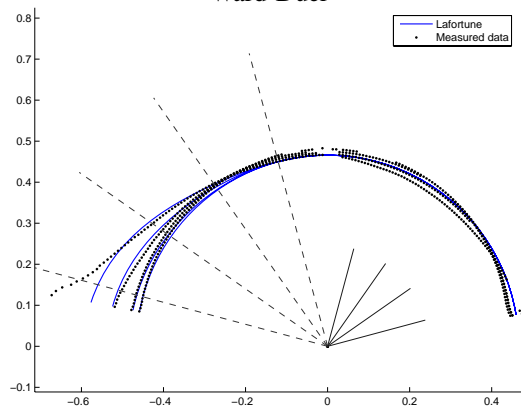
Ward



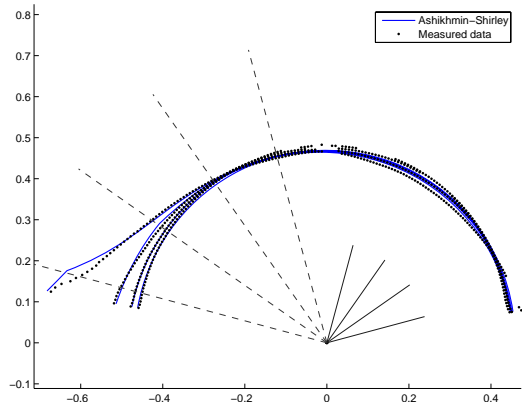
Ward-Duer



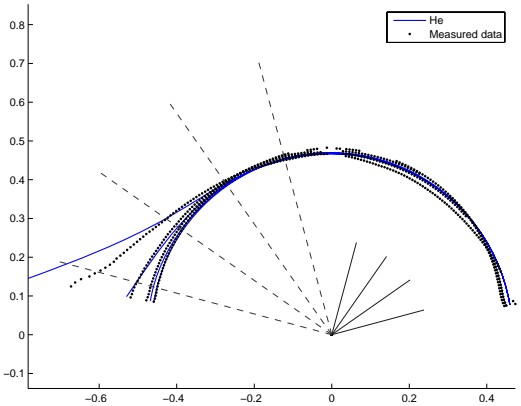
Cook-Torrance



Lafortune



Ashikhmin-Shirley



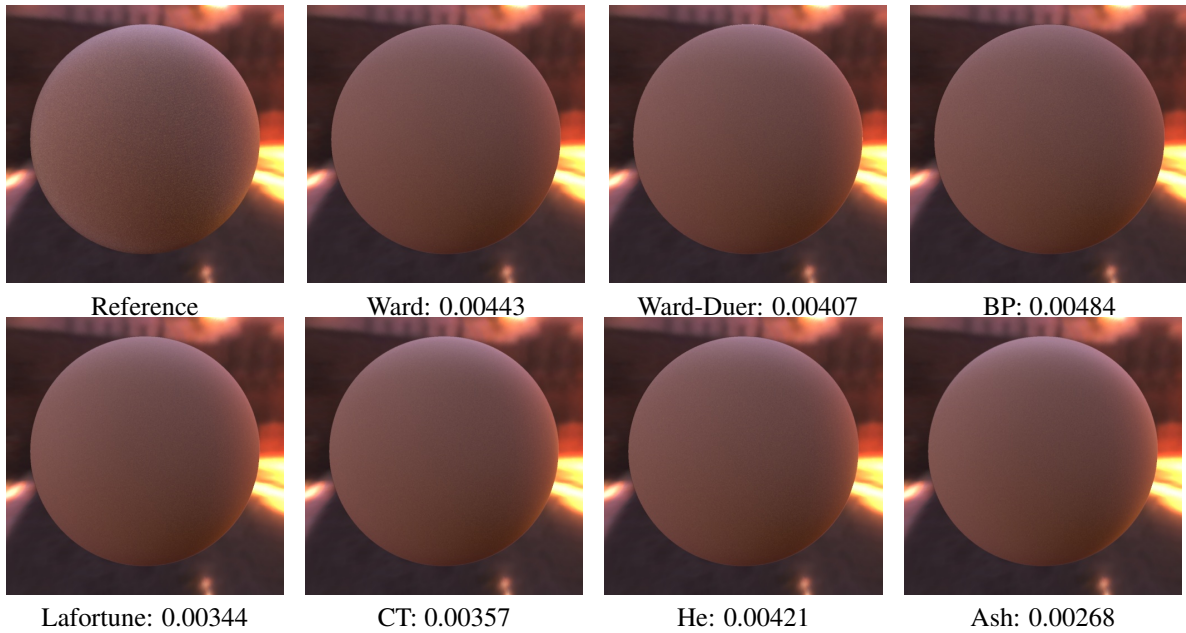
He

Material Name: fabric-beige

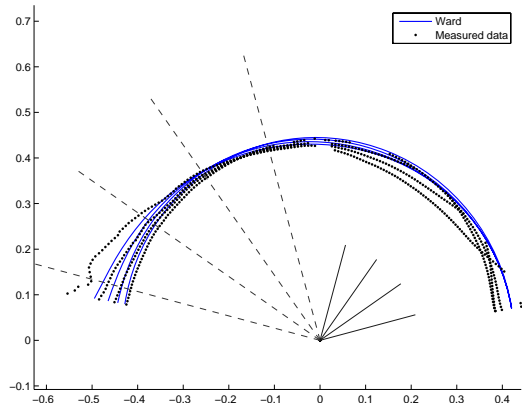
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.237	0.141	0.0853	0.0347	0.0161	0.00663	0.5			0.00443
Ward-Duer	0.237	0.14	0.084	0.0218	0.0125	0.00639	0.5			0.00407
Blinn-Phong	0.25	0.148	0.088	0.000481	0.000186	5.2e-005	159			0.00484
Lafortune et al.	0.241	0.141	0.0842	0.1	0.0653	0.0371	-0.707	5.09e-008	2.29	0.00344
Cook-Torrance	0.228	0.133	0.0798	0.175	0.11	0.0622	0.158	0.741		0.00357
He et al.	0.246	0.145	0.0863	0.233	0.151	0.087	20	4	1.3	0.00421
Ashikhmin-Shirley	0.199	0.112	0.0664	0.197	0.136	0.0822	0.973	0.5		0.00268

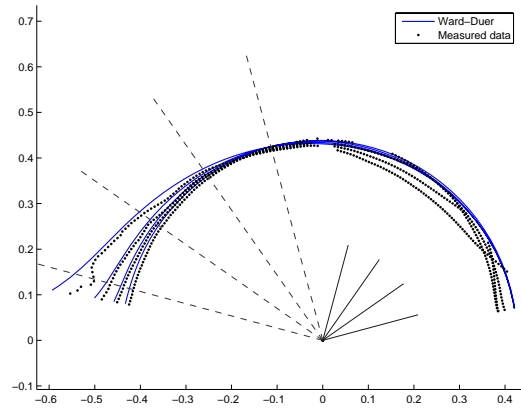
Rendered Images



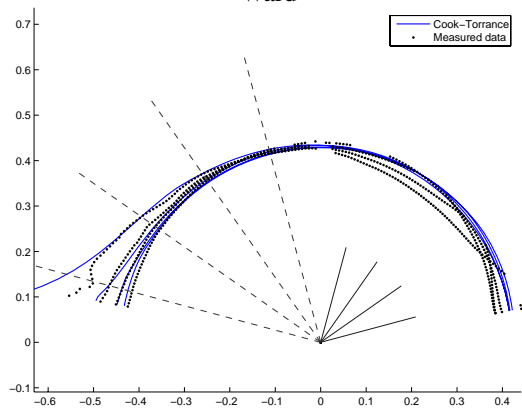
BRDF Plots in the incidence plane (Cubic root applied)



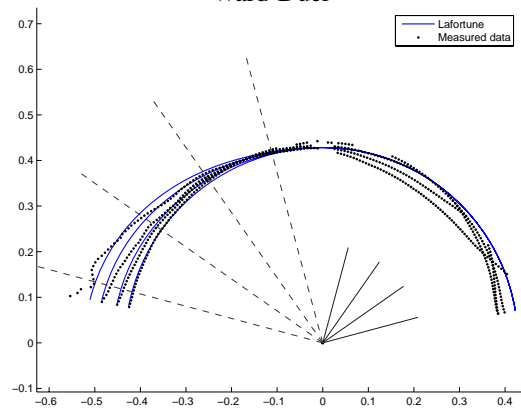
Ward



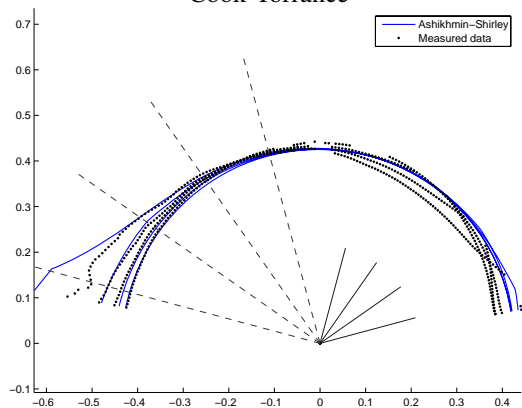
Ward-Duer



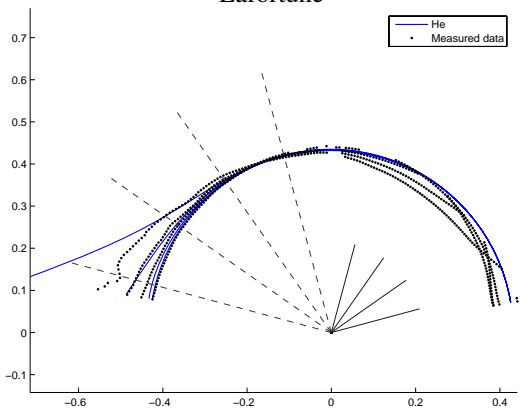
Cook-Torrance



Lafortune



Ashikhmin-Shirley



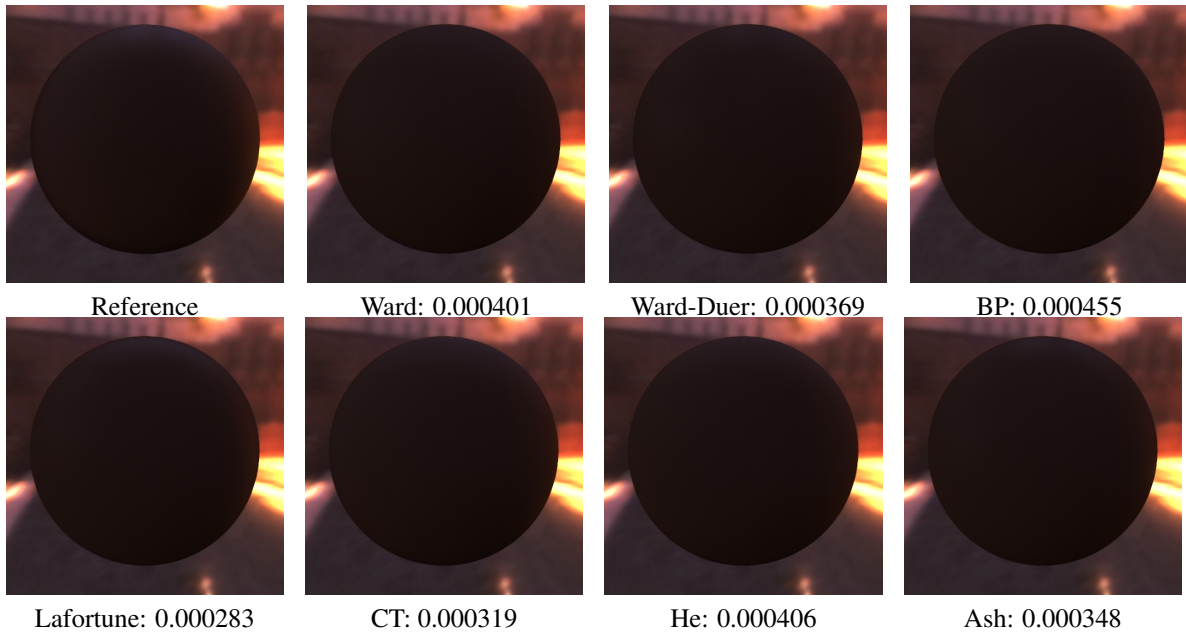
He

Material Name: fabric-black

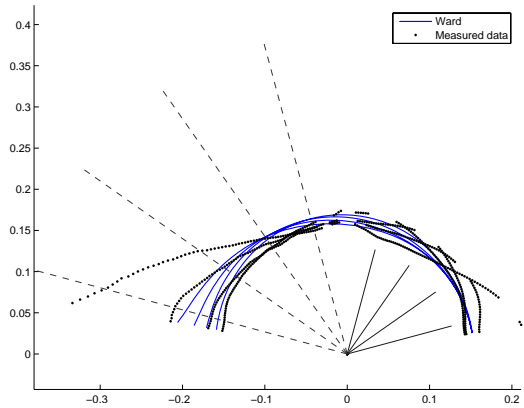
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.0108	0.00503	0.00301	0.00374	0.00209	0.00145	0.5			0.000401
Ward-Duer	0.0118	0.00557	0.00339	0.000689	0.000407	0.000281	0.199			0.000369
Blinn-Phong	0.0122	0.0058	0.00354	0.000109	5.82e-005	4.41e-005	83.1			0.000455
Lafortune et al.	0.0119	0.00566	0.00345	0.00772	0.00462	0.00312	-0.623	0.474	22.6	0.000283
Cook-Torrance	0.00954	0.00425	0.00252	0.00983	0.00581	0.00384	0.35	0.65		0.000319
He et al.	0.00861	0.00356	0.00216	0.0732	0.0458	0.0285	8	4	2.09	0.000406
Ashikhmin-Shirley	0.0119	0.00565	0.00344	0.00483	0.00295	0.00207	0.0995	45.4		0.000348

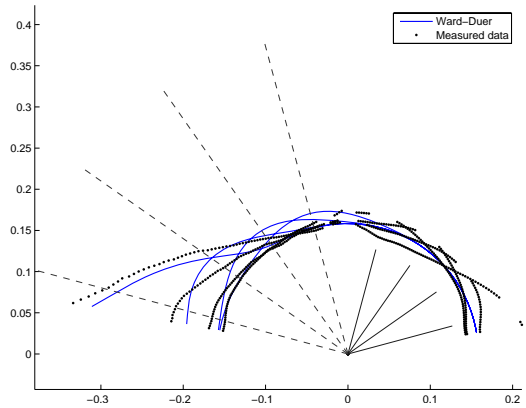
Rendered Images



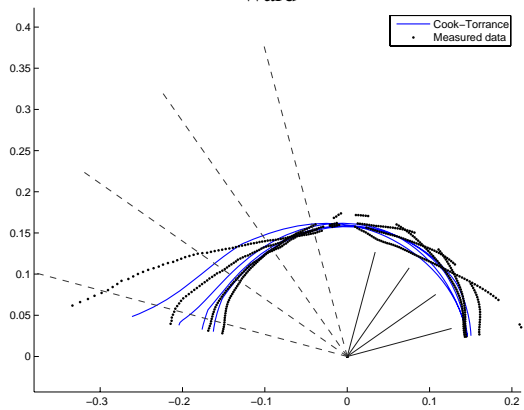
BRDF Plots in the incidence plane (Cubic root applied)



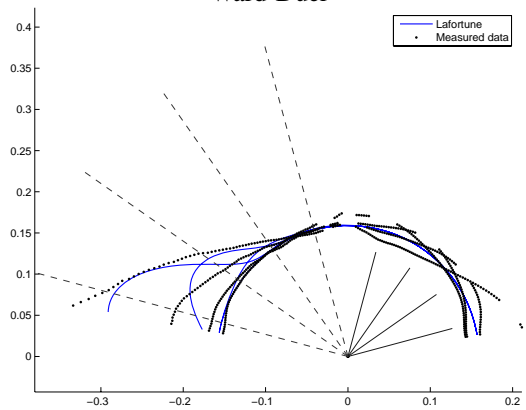
Ward



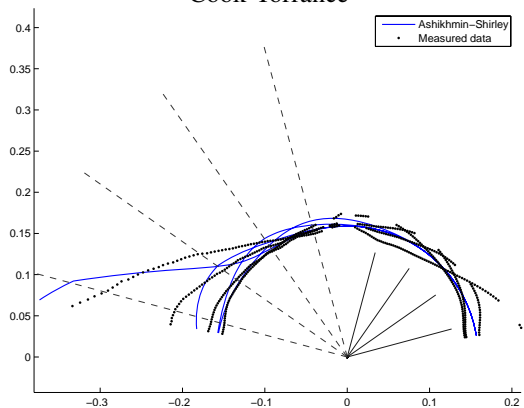
Ward-Duer



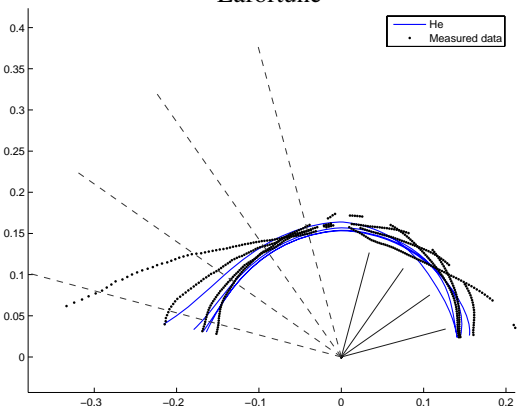
Cook-Torrance



Lafortune



Ashikhmin-Shirley



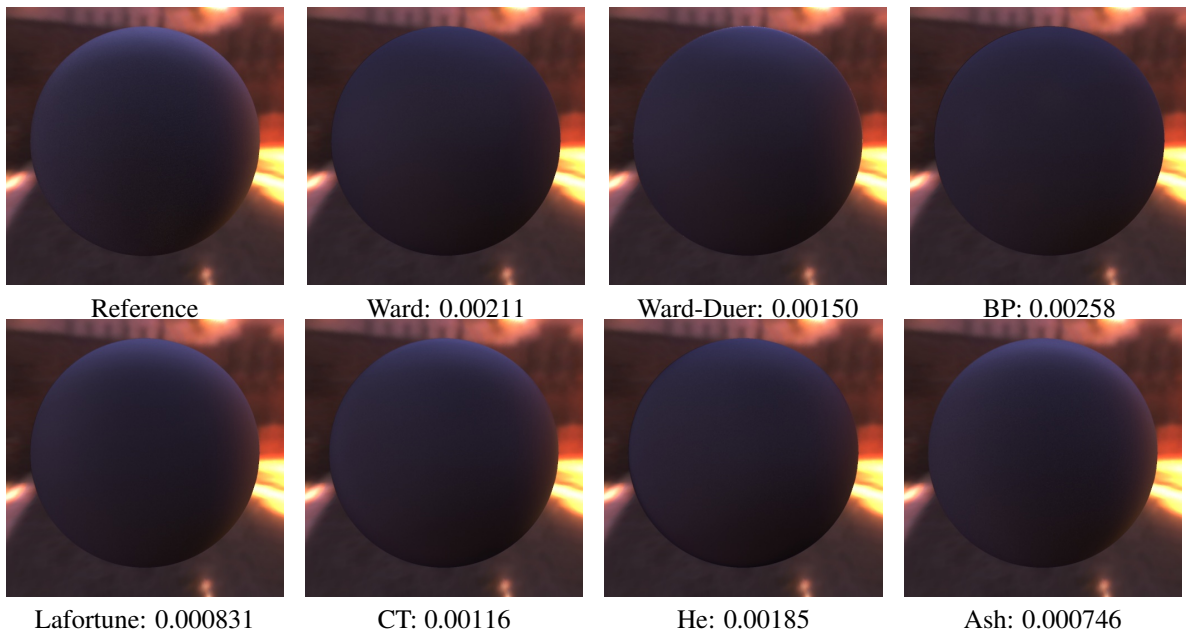
He

Material Name: fabric-blue

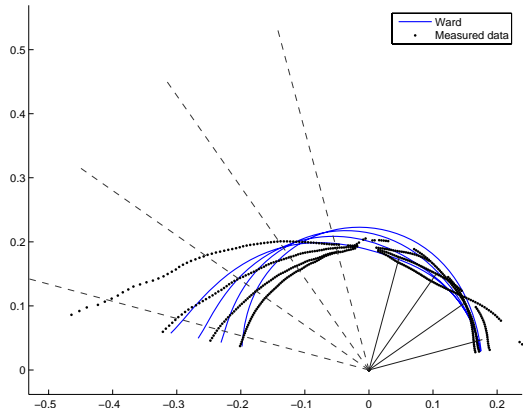
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.0163	0.0153	0.0277	0.0174	0.0159	0.018	0.5			0.00211
Ward-Duer	0.0156	0.0148	0.0273	0.0123	0.0111	0.0123	0.5			0.0015
Blinn-Phong	0.0232	0.0216	0.0349	0.000272	0.000254	0.000286	114			0.00258
Lafortune et al.	0.0196	0.0184	0.0313	0.0643	0.0576	0.0642	-0.707	1.23e-010	3.63	0.000831
Cook-Torrance	0.00945	0.00922	0.0211	0.0496	0.0447	0.0498	0.349	0.65		0.00116
He et al.	0.00699	0.00686	0.0183	0.081	0.0736	0.0827	12	4	4.1	0.00185
Ashikhmin-Shirley	0.00113	0.00176	0.0127	0.0702	0.063	0.0703	0.969	1.09		0.000746

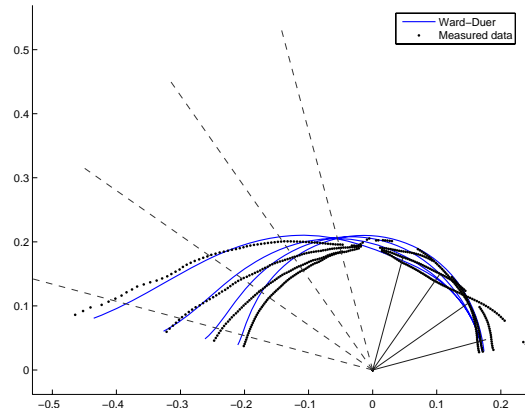
Rendered Images



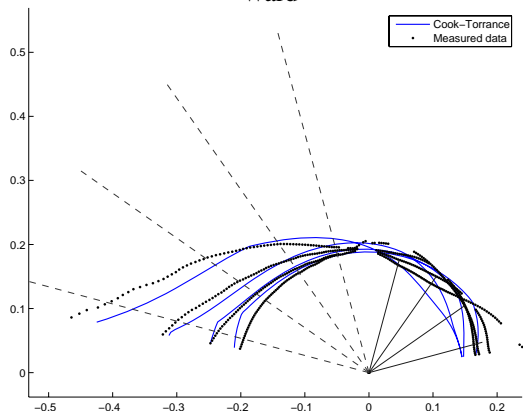
BRDF Plots in the incidence plane (Cubic root applied)



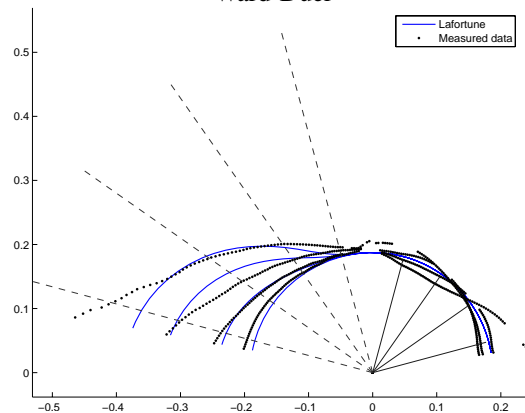
Ward



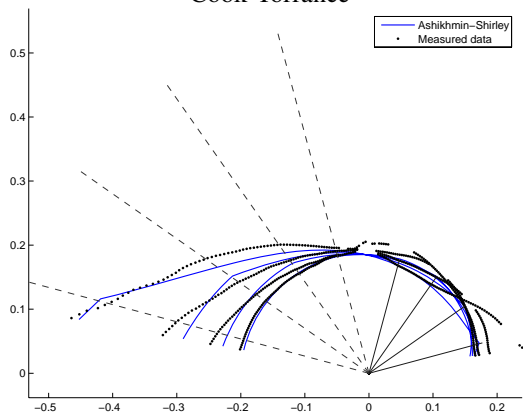
Ward-Duer



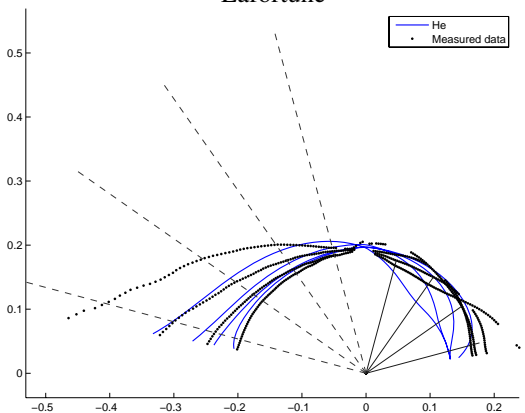
Cook-Torrance



Lafortune



Ashikhmin-Shirley



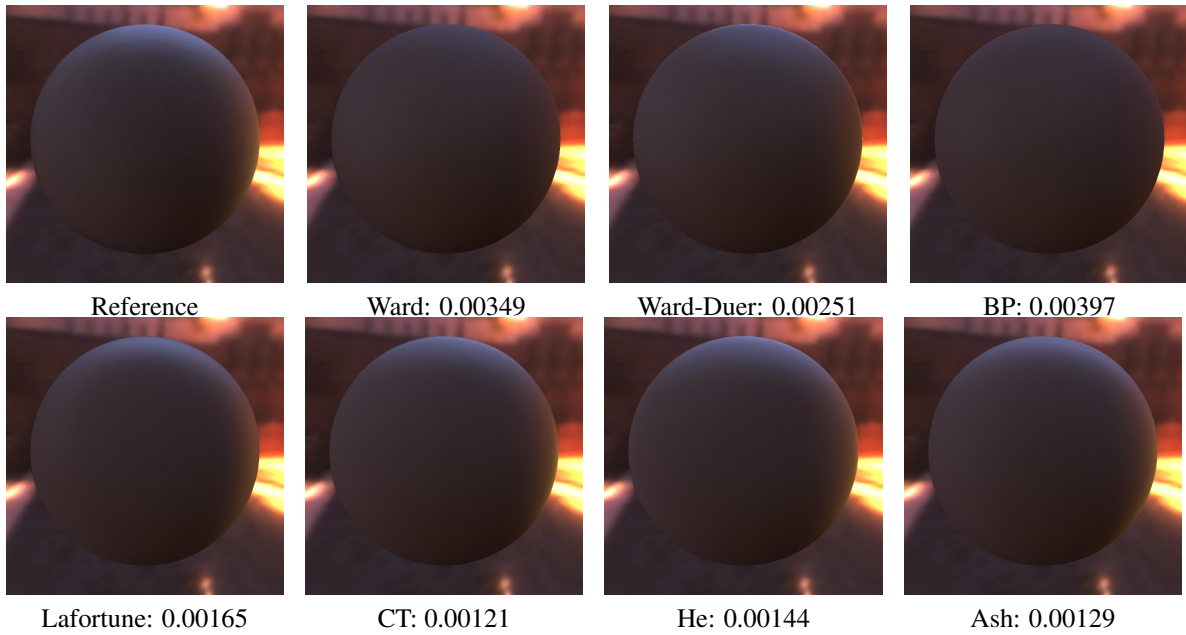
He

Material Name: fabric-green

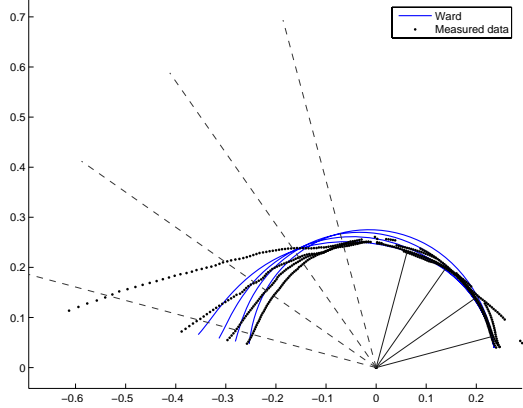
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.0409	0.0298	0.0242	0.0228	0.0276	0.0215	0.5			0.00349
Ward-Duer	0.0391	0.0278	0.0226	0.0175	0.0209	0.0163	0.5			0.00251
Blinn-Phong	0.0474	0.0375	0.0302	0.00177	0.00223	0.00172	20			0.00397
Lafortune et al.	0.0473	0.0376	0.0302	0.0959	0.115	0.0899	-0.685	0.245	10.3	0.00165
Cook-Torrance	0.0423	0.0315	0.0255	0.152	0.183	0.143	0.0446	0.558		0.00121
He et al.	0.0389	0.0275	0.0223	2.43	2.9	2.27	18.9	8.74	1.19	0.00144
Ashikhmin-Shirley	0.032	0.0192	0.0158	0.344	0.414	0.324	0.137	1.55		0.00129

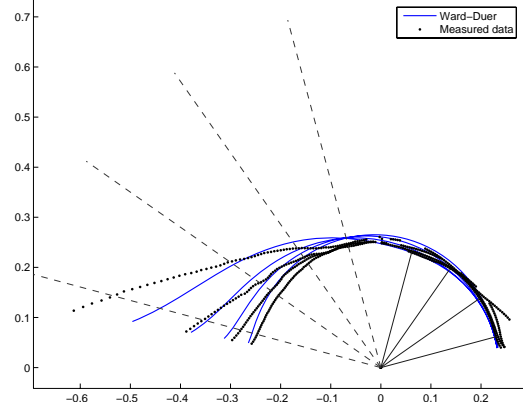
Rendered Images



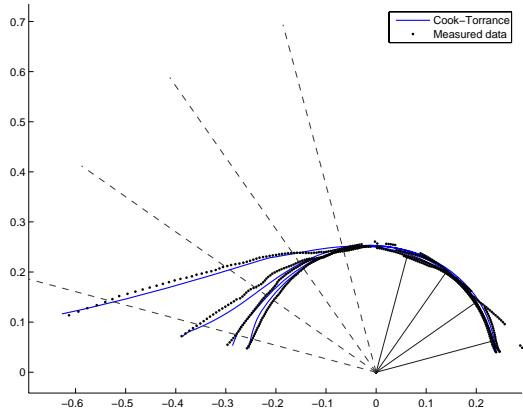
BRDF Plots in the incidence plane (Cubic root applied)



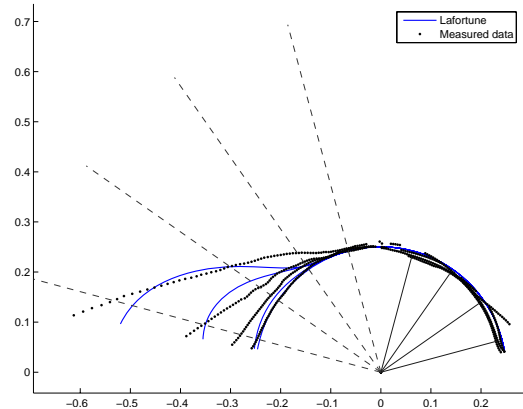
Ward



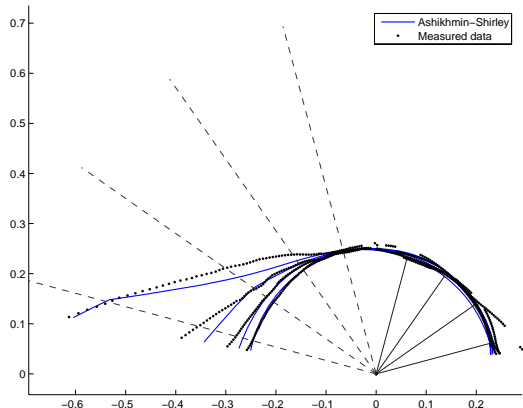
Ward-Duer



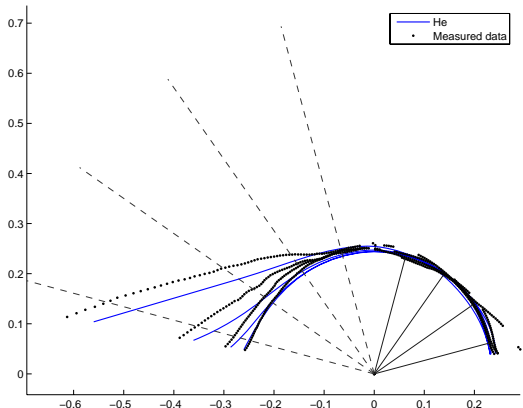
Cook-Torrance



Lafortune



Ashikhmin-Shirley



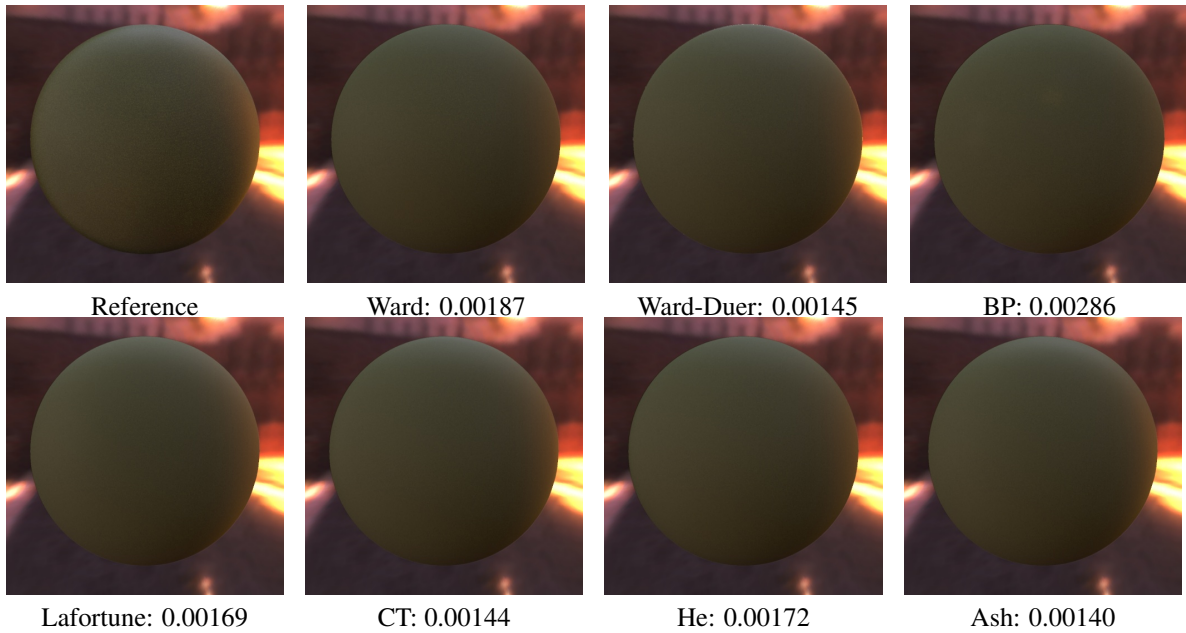
He

Material Name: fabric-green-latex

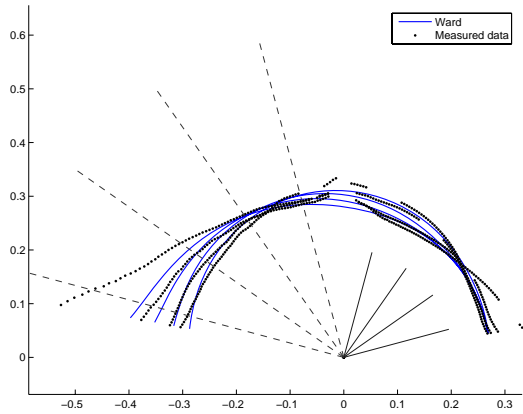
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.0606	0.0779	0.0226	0.0314	0.0289	0.0112	0.5			0.00187
Ward-Duer	0.0622	0.0794	0.0231	0.0179	0.0164	0.00645	0.5			0.00145
Blinn-Phong	0.0731	0.0894	0.0271	0.000423	0.000389	0.000147	244			0.00286
Lafortune et al.	0.0671	0.0838	0.0249	0.0566	0.0527	0.0202	-0.696	0.179	3.21	0.00169
Cook-Torrance	0.0589	0.0763	0.0219	0.0445	0.041	0.0162	0.391	0.527		0.00144
He et al.	0.0572	0.0748	0.0214	0.0428	0.0393	0.0154	16	4	8.1	0.00172
Ashikhmin-Shirley	0.058	0.0754	0.0215	0.0502	0.0463	0.0185	0.603	4.67		0.0014

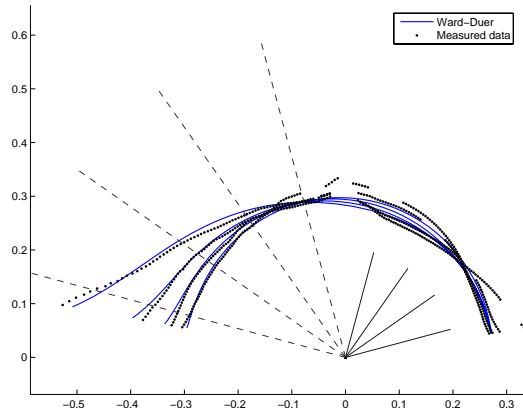
Rendered Images



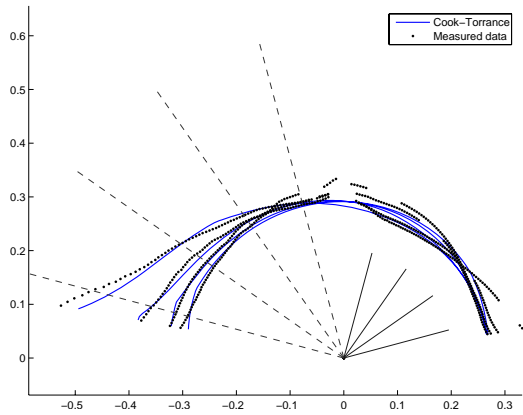
BRDF Plots in the incidence plane (Cubic root applied)



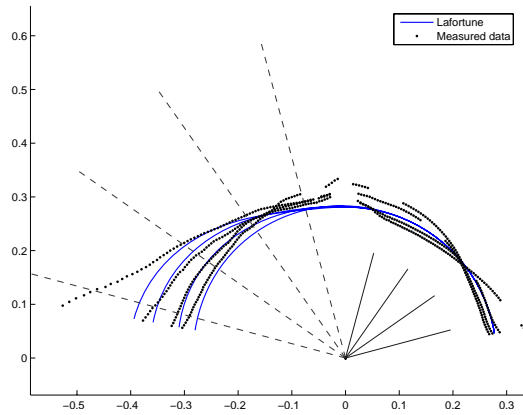
Ward



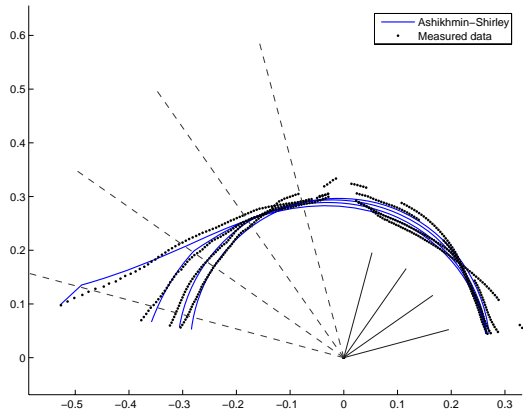
Ward-Duer



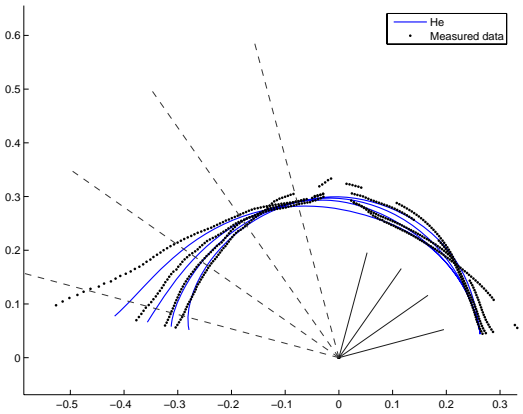
Cook-Torrance



Lafortune



Ashikhmin-Shirley



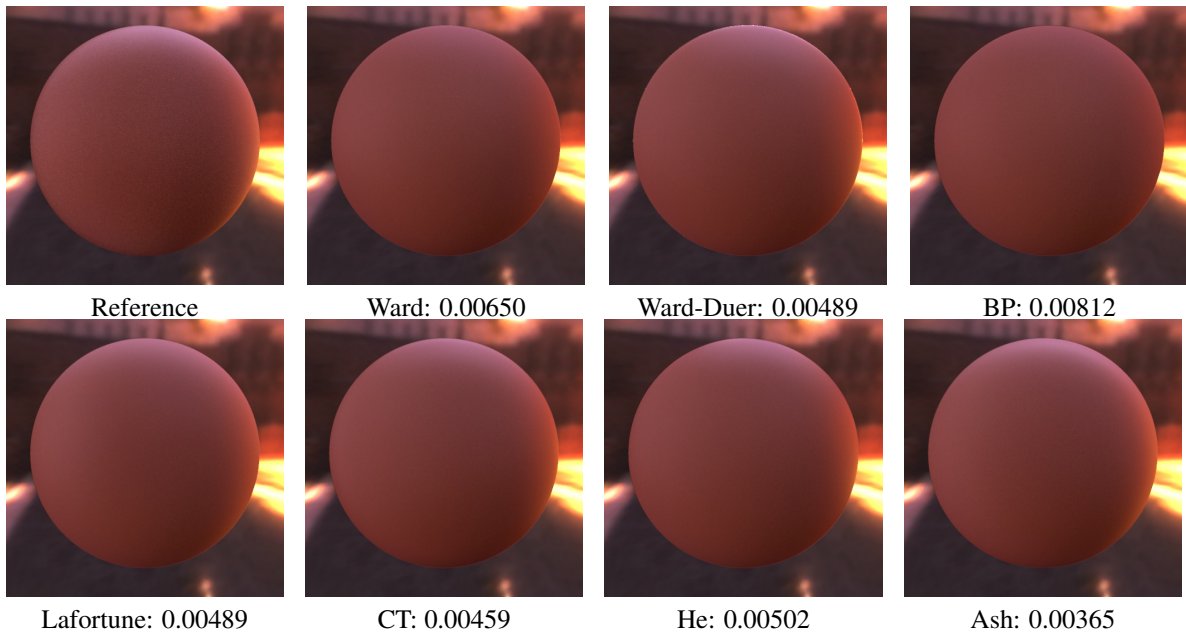
He

Material Name: fabric-pink

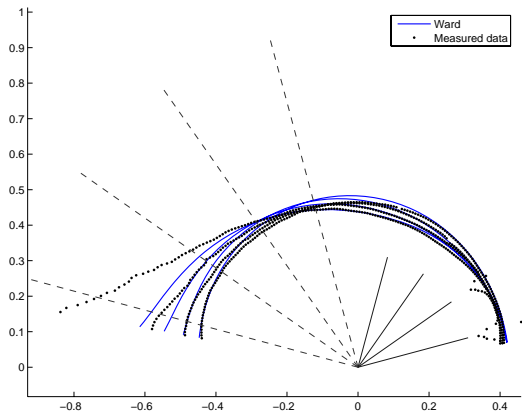
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.235	0.0593	0.0357	0.116	0.0561	0.0345	0.5			0.0065
Ward-Duer	0.24	0.0595	0.0354	0.0673	0.036	0.0229	0.5			0.00489
Blinn-Phong	0.247	0.0676	0.0414	0.0218	0.00913	0.00523	10.2			0.00812
Lafortune et al.	0.254	0.0671	0.0399	0.215	0.117	0.0763	-0.692	0.204	3.06	0.00489
Cook-Torrance	0.223	0.0508	0.0297	0.0792	0.0417	0.0267	0.908	0.545		0.00459
He et al.	0.246	0.0626	0.0373	0.388	0.21	0.133	20	4.16	2.08	0.00502
Ashikhmin-Shirley	0.187	0.0305	0.0162	0.242	0.131	0.0854	0.999	1.96		0.00365

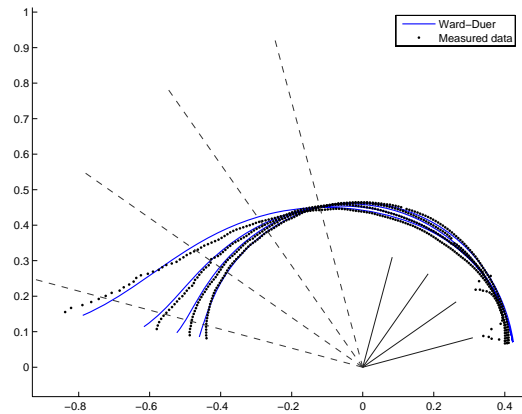
Rendered Images



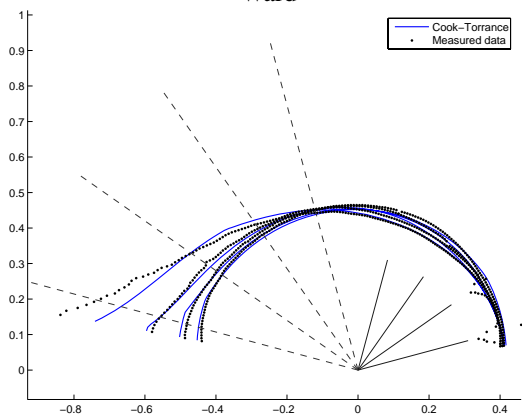
BRDF Plots in the incidence plane (Cubic root applied)



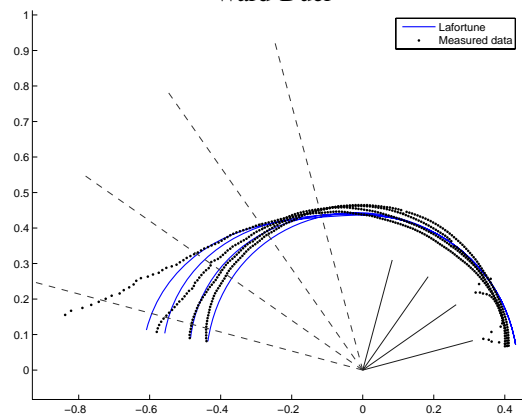
Ward



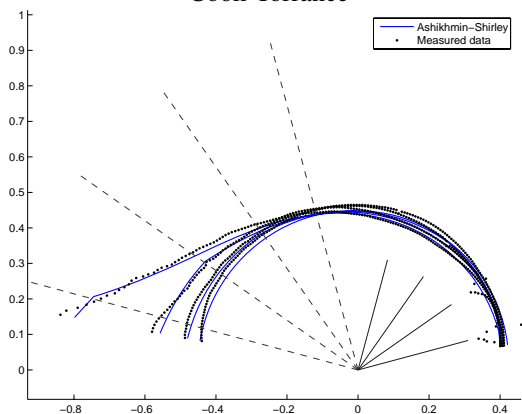
Ward-Duer



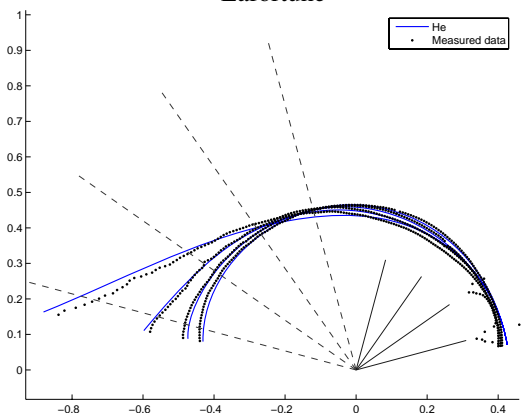
Cook-Torrance



Lafortune



Ashikhmin-Shirley



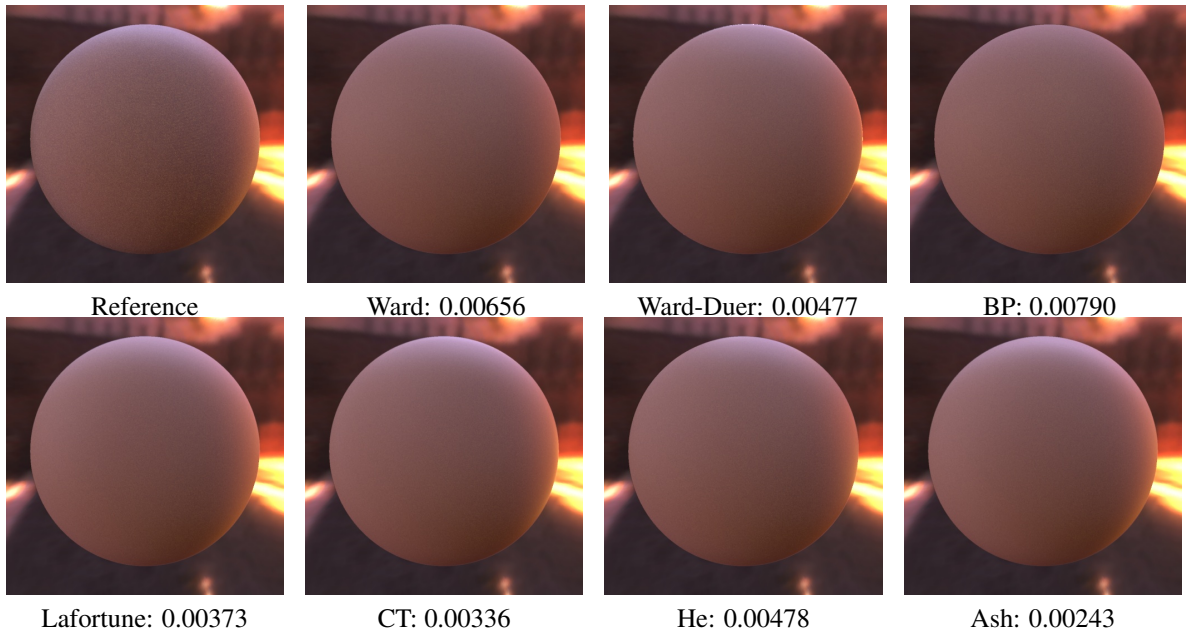
He

Material Name: fabric-pink-felt

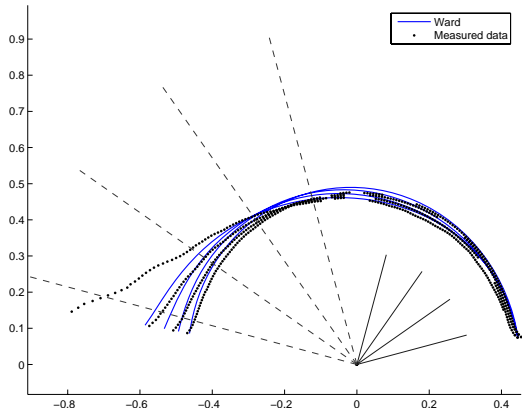
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.281	0.17	0.112	0.083	0.0623	0.0318	0.5			0.00656
Ward-Duer	0.283	0.169	0.109	0.0514	0.0411	0.0248	0.5			0.00477
Blinn-Phong	0.296	0.182	0.12	0.0118	0.00811	0.00272	13			0.0079
Lafortune et al.	0.301	0.183	0.116	0.234	0.196	0.134	-0.707	1.49e-006	3.42	0.00373
Cook-Torrance	0.277	0.164	0.104	0.333	0.272	0.179	0.129	0.643		0.00336
He et al.	0.293	0.177	0.113	0.363	0.294	0.182	20	4.11	1.76	0.00478
Ashikhmin-Shirley	0.234	0.129	0.08	0.308	0.253	0.169	0.733	1.43		0.00243

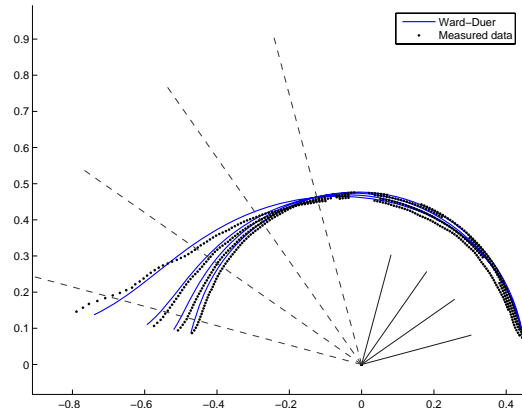
Rendered Images



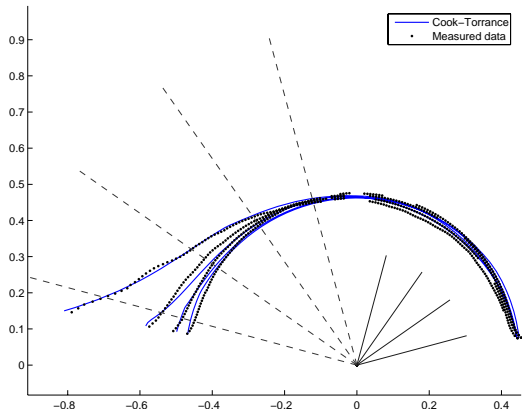
BRDF Plots in the incidence plane (Cubic root applied)



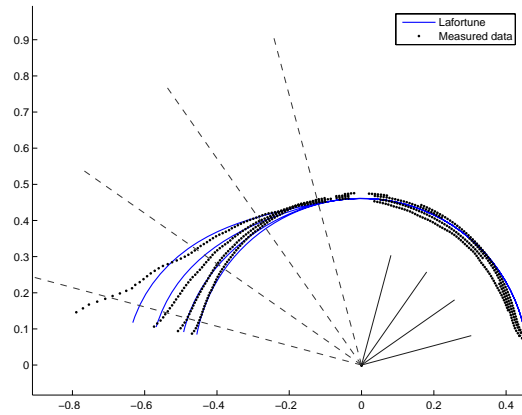
Ward



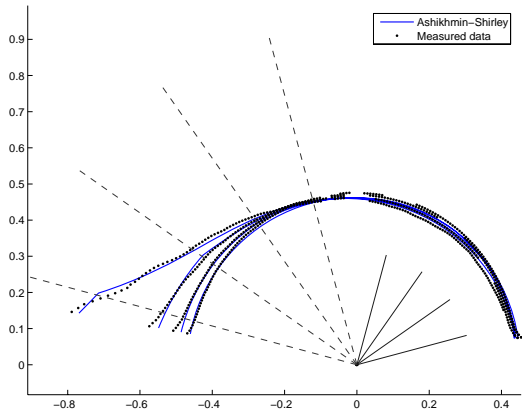
Ward-Duer



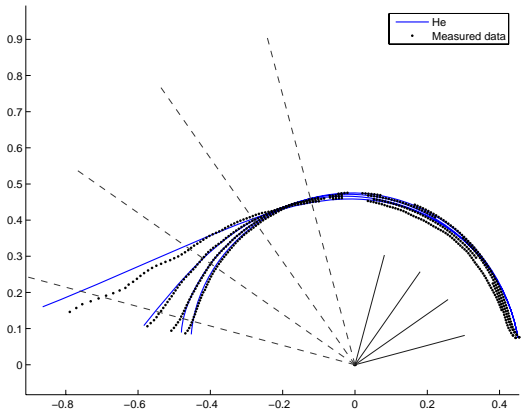
Cook-Torrance



Lafortune



Ashikhmin-Shirley



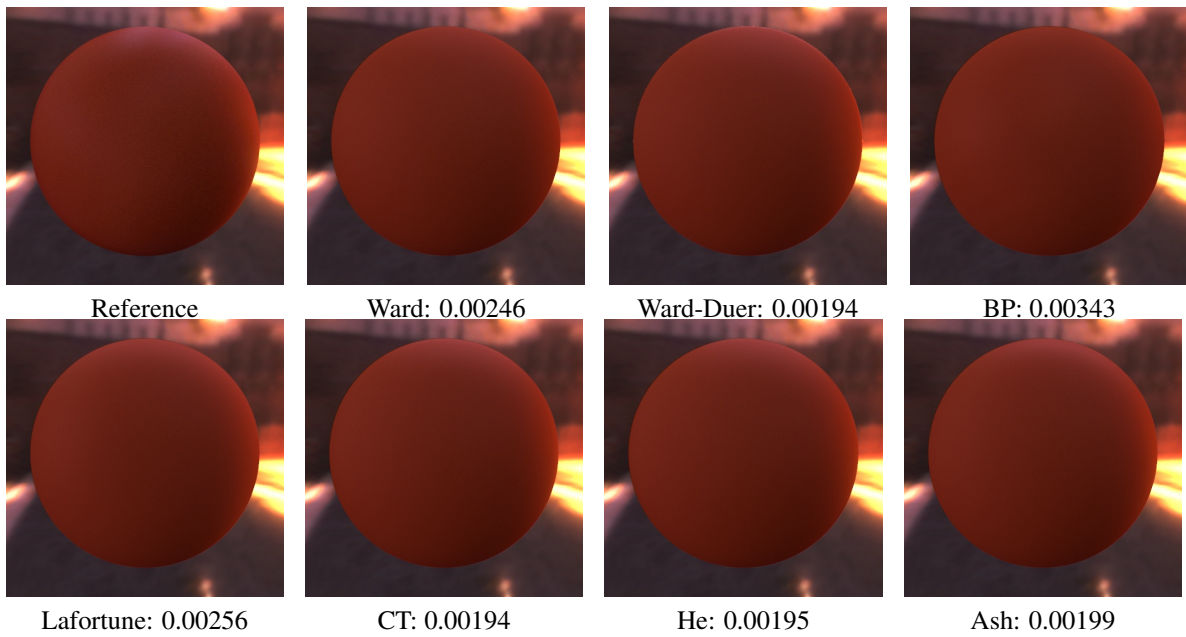
He

Material Name: fabric-red

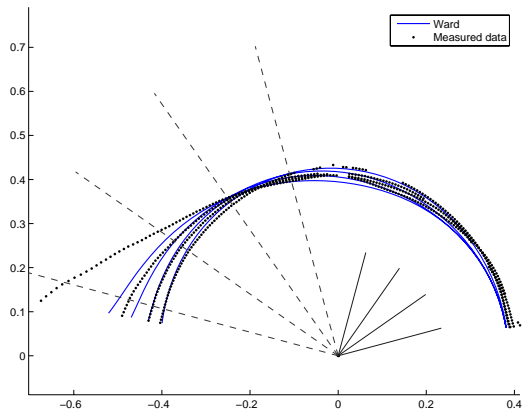
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.176	0.017	0.00287	0.063	0.0134	0.00565	0.5			0.00246
Ward-Duer	0.179	0.0177	0.00287	0.0349	0.00771	0.00365	0.5			0.00194
Blinn-Phong	0.191	0.0204	0.00426	0.00634	0.00133	0.00056	25.2			0.00343
Lafortune et al.	0.189	0.02	0.00395	0.0888	0.019	0.00901	-0.669	0.326	4.48	0.00256
Cook-Torrance	0.18	0.0178	0.00292	0.0825	0.0184	0.00871	0.297	0.442		0.00194
He et al.	0.175	0.0167	0.00245	0.286	0.0638	0.03	12	3.05	2.13	0.00195
Ashikhmin-Shirley	0.176	0.0168	0.00242	0.12	0.0268	0.0128	0.4	5.56		0.00199

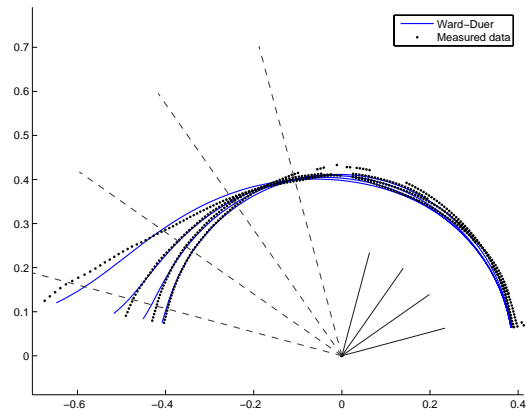
Rendered Images



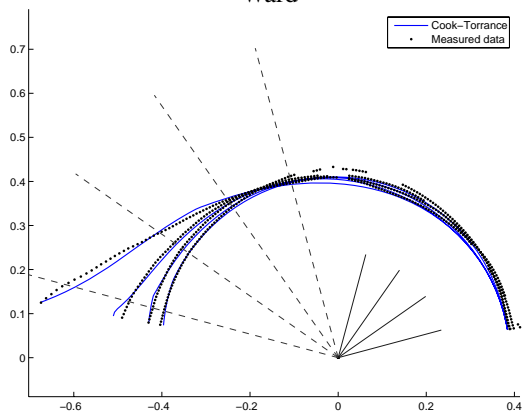
BRDF Plots in the incidence plane (Cubic root applied)



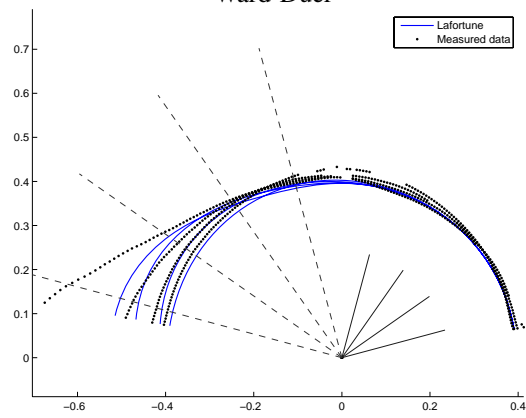
Ward



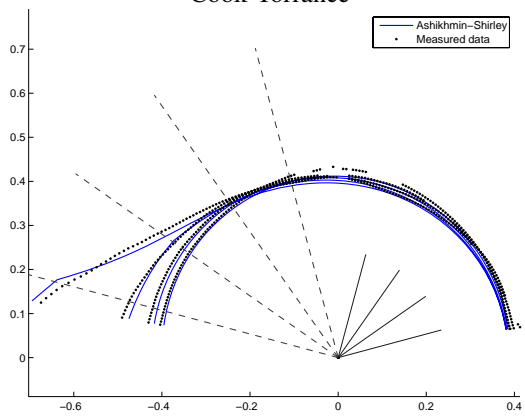
Ward-Duer



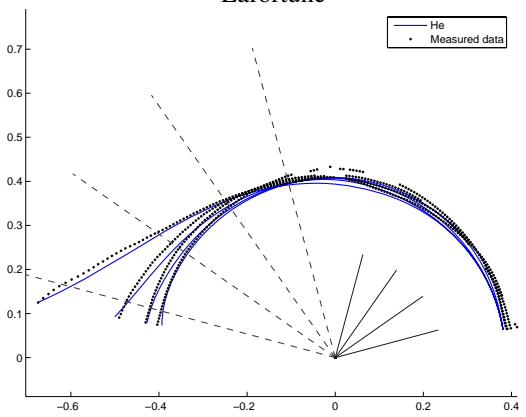
Cook-Torrance



Lafortune



Ashikhmin-Shirley



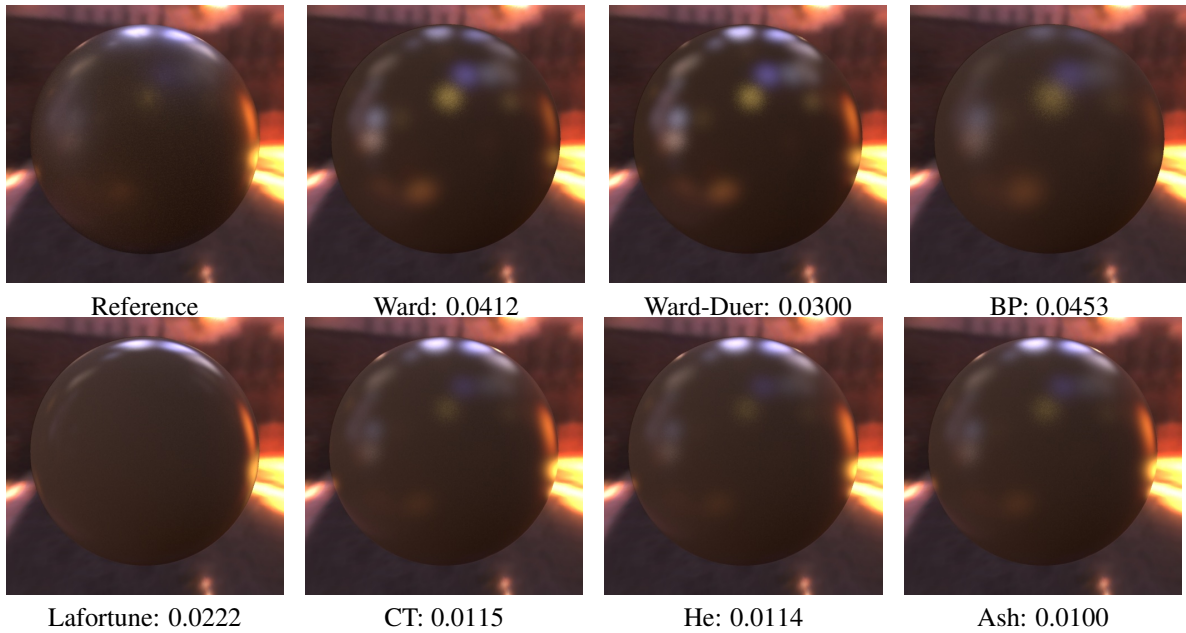
He

Material Name: fruitwood-241

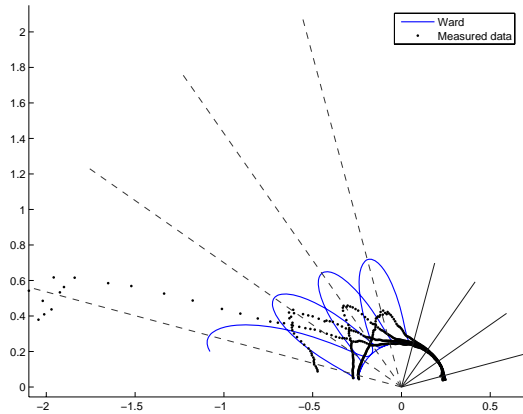
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.0472	0.0292	0.0119	0.0398	0.0325	0.0212	0.0914			0.0412
Ward-Duer	0.0431	0.0258	0.00958	0.0319	0.0262	0.0172	0.0862			0.03
Blinn-Phong	0.0515	0.0327	0.0141	0.0107	0.00876	0.00573	131			0.0453
Lafortune et al.	0.0644	0.0432	0.021	0.516	0.425	0.278	-0.586	0.559	296	0.0222
Cook-Torrance	0.0568	0.0369	0.0168	0.305	0.251	0.166	0.0233	0.0924		0.0115
He et al.	0.0568	0.0369	0.0168	0.405	0.334	0.221	28	1.33	1.3	0.0114
Ashikhmin-Shirley	0.0551	0.0355	0.0159	0.336	0.277	0.183	0.0341	199		0.01

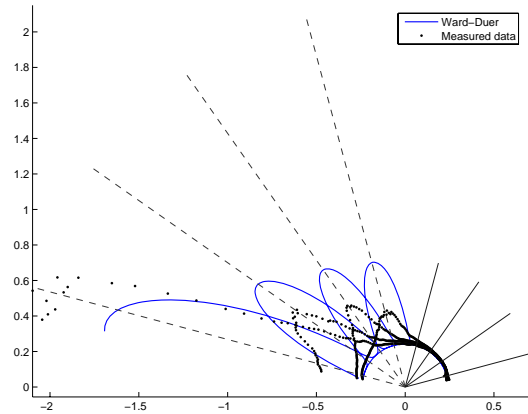
Rendered Images



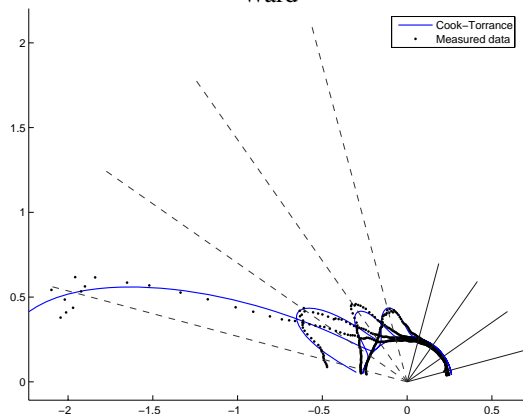
BRDF Plots in the incidence plane (Cubic root applied)



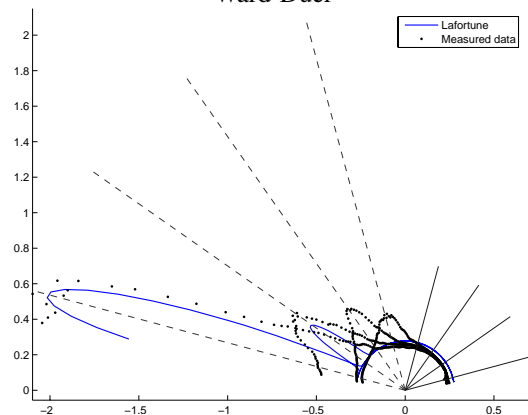
Ward



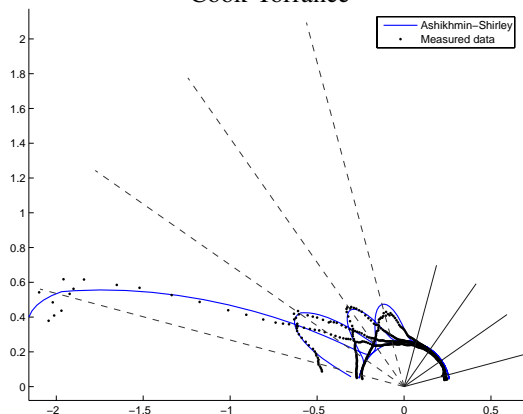
Ward-Duer



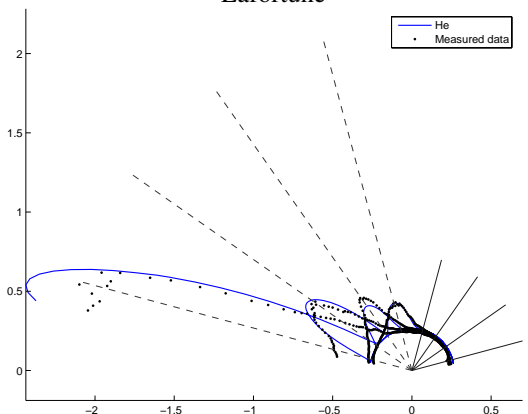
Cook-Torrance



Lafortune



Ashikhmin-Shirley



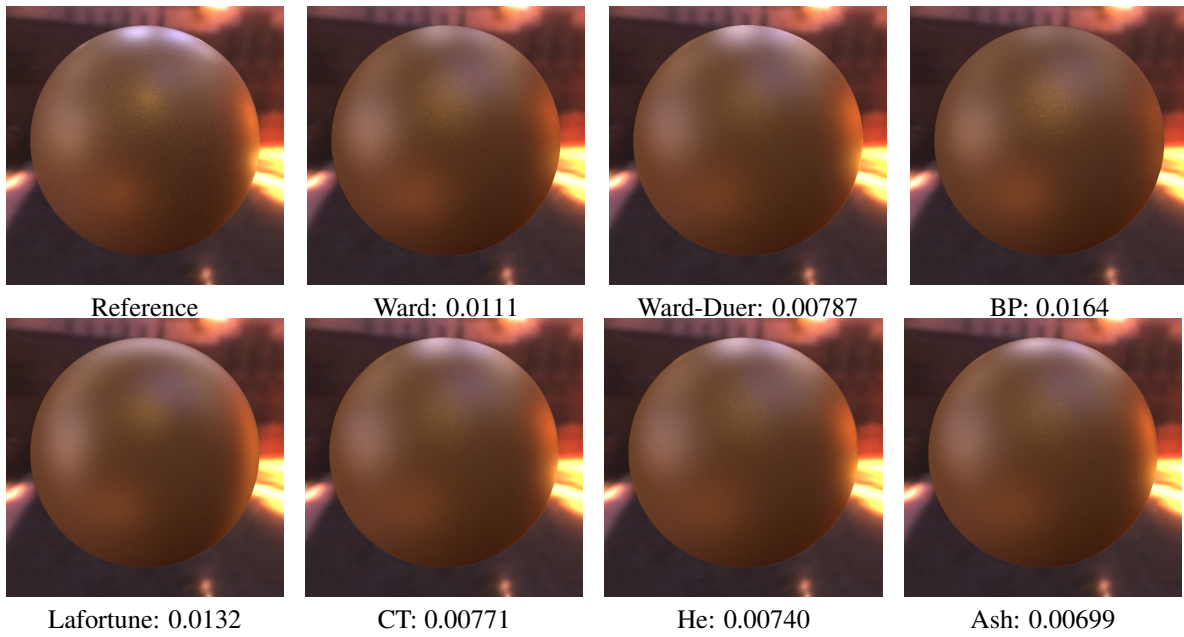
He

Material Name: gold-paint

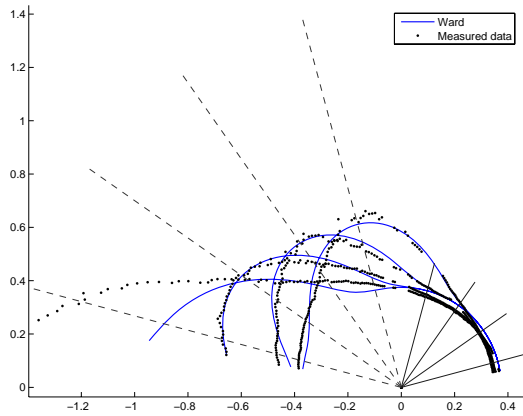
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.161	0.0758	0.0169	0.132	0.0924	0.041	0.234			0.0111
Ward-Duer	0.177	0.0853	0.0189	0.0691	0.0502	0.025	0.223			0.00787
Blinn-Phong	0.164	0.0796	0.0205	0.0392	0.0265	0.0107	36.8			0.0164
Lafortune et al.	0.173	0.0838	0.0202	0.209	0.147	0.0657	-0.595	0.541	14.3	0.0132
Cook-Torrance	0.176	0.0848	0.0187	0.159	0.115	0.0572	0.409	0.214		0.00771
He et al.	0.174	0.0829	0.0177	0.313	0.228	0.113	27.9	3.13	2.88	0.0074
Ashikhmin-Shirley	0.171	0.0812	0.0169	0.156	0.114	0.0565	0.538	33.1		0.00699

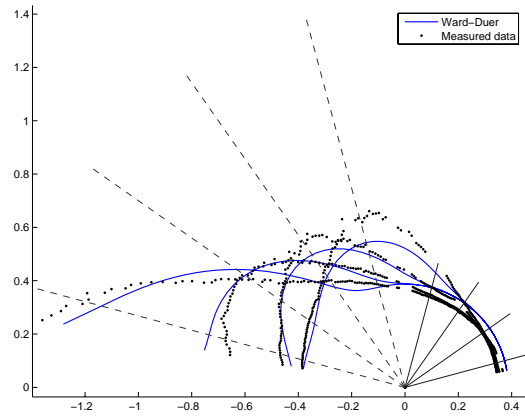
Rendered Images



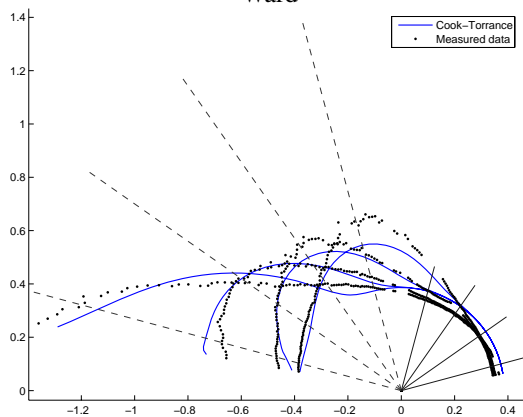
BRDF Plots in the incidence plane (Cubic root applied)



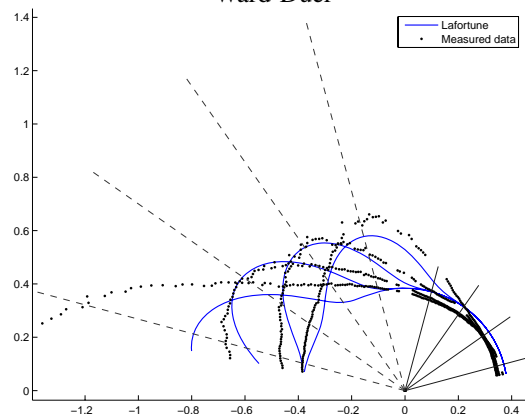
Ward



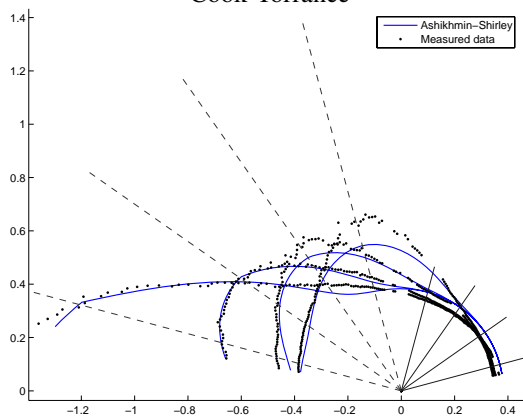
Ward-Duer



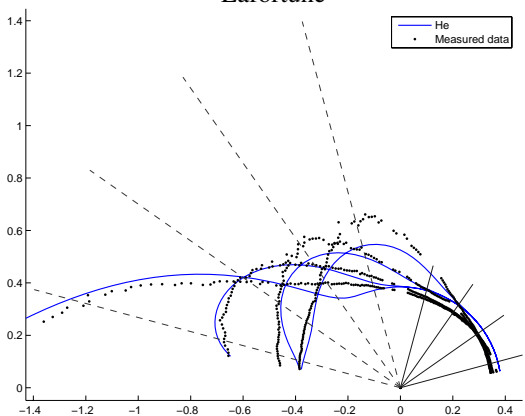
Cook-Torrance



Lafortune



Ashikhmin-Shirley



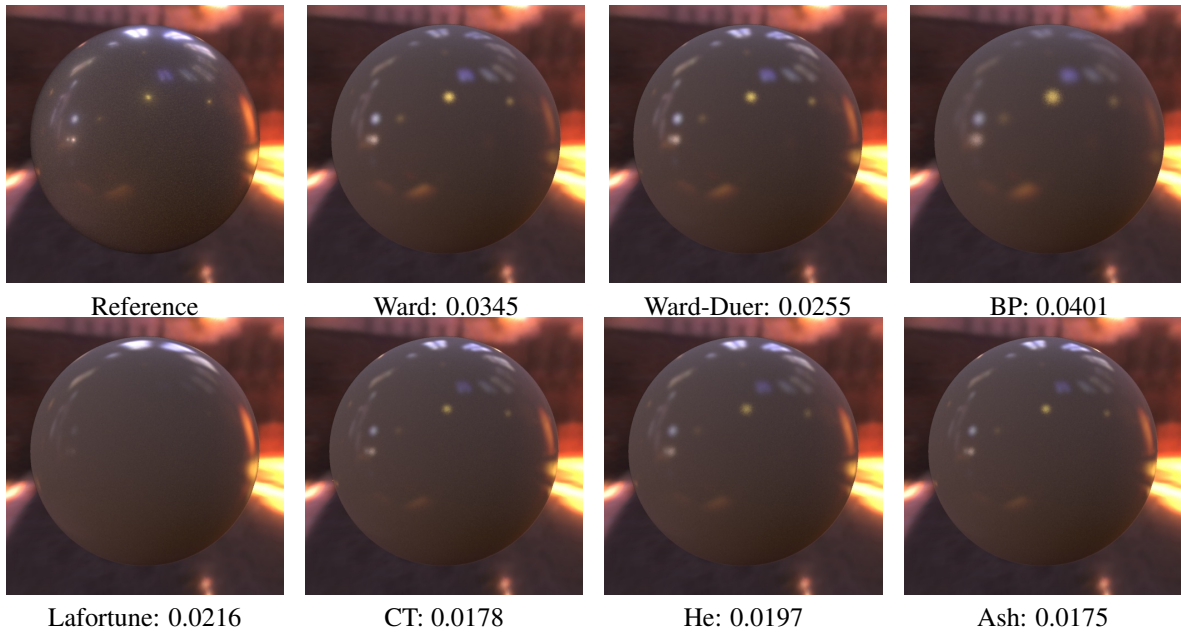
He

Material Name: gray-plastic

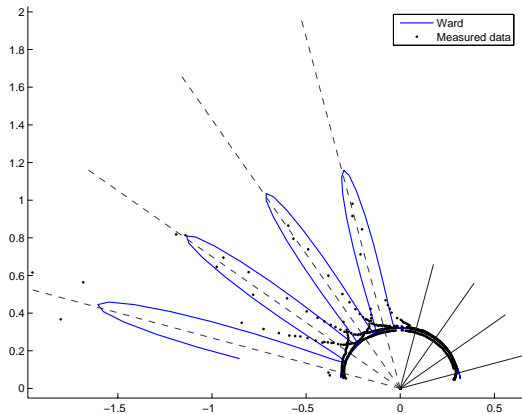
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.102	0.0888	0.0575	0.0188	0.0155	0.00974	0.0302			0.0345
Ward-Duer	0.101	0.0883	0.0572	0.0137	0.0117	0.00729	0.031			0.0255
Blinn-Phong	0.102	0.0887	0.0573	0.00699	0.00566	0.0036	1.04e+003			0.0401
Lafortune et al.	0.106	0.092	0.0595	0.347	0.298	0.185	-0.579	0.573	978	0.0216
Cook-Torrance	0.104	0.0905	0.0586	0.0757	0.0652	0.0402	0.0654	0.026		0.0178
He et al.	0.104	0.09	0.0583	0.109	0.0937	0.0589	28.3	0.467	1.62	0.0197
Ashikhmin-Shirley	0.104	0.0905	0.0586	0.0827	0.0711	0.0436	0.0712	3e+003		0.0175

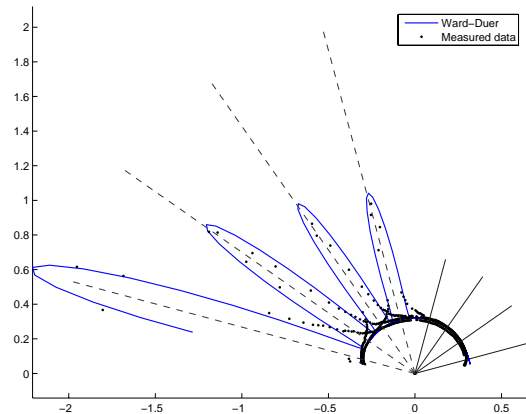
Rendered Images



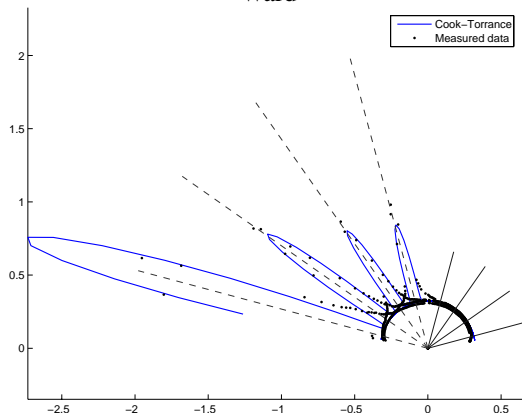
BRDF Plots in the incidence plane (Cubic root applied)



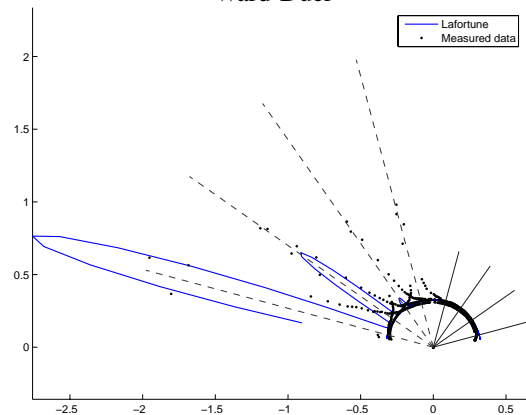
Ward



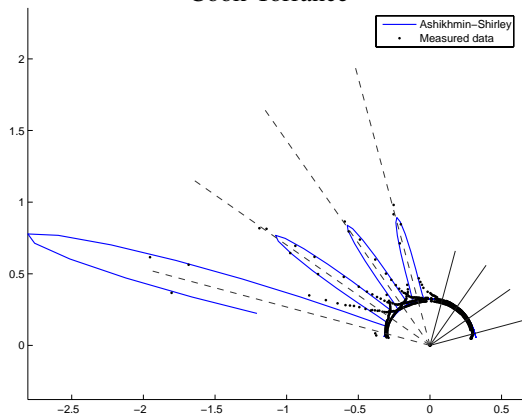
Ward-Duer



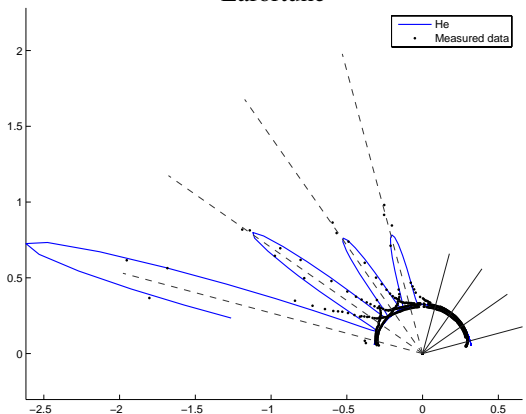
Cook-Torrance



Lafortune



Ashikhmin-Shirley



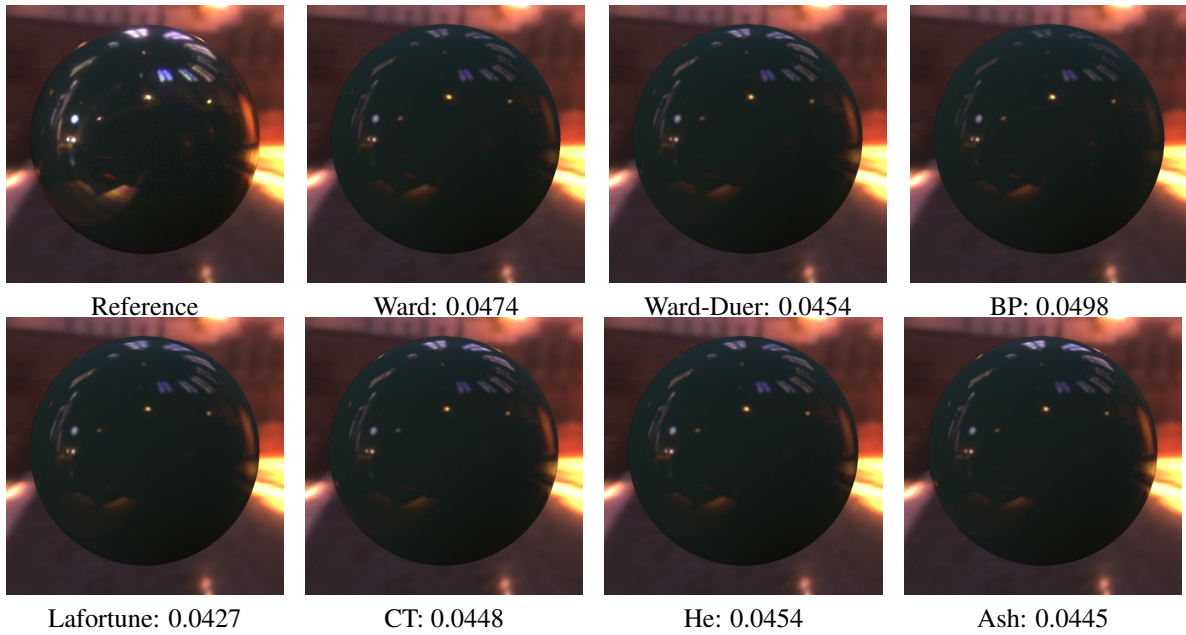
He

Material Name: green-bball

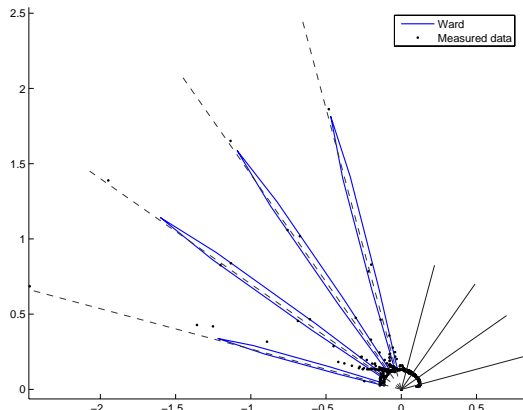
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.00684	0.0216	0.013	0.0082	0.0052	0.00357	0.00997			0.0474
Ward-Duer	0.0067	0.0216	0.0129	0.00598	0.00381	0.00266	0.0104			0.0454
Blinn-Phong	0.00727	0.0219	0.0132	0.00247	0.00158	0.00107	2e+004			0.0498
Lafortune et al.	0.00697	0.0214	0.0128	0.0251	0.018	0.0129	-0.577	0.577	5.49e+003	0.0427
Cook-Torrance	0.00704	0.0217	0.013	0.0341	0.0222	0.0155	0.139	0.00989		0.0448
He et al.	0.00666	0.0215	0.0129	0.0132	0.00846	0.00591	62.9	0.33	5.62	0.0454
Ashikhmin-Shirley	0.0071	0.0217	0.013	0.0455	0.03	0.021	0.106	2.13e+004		0.0445

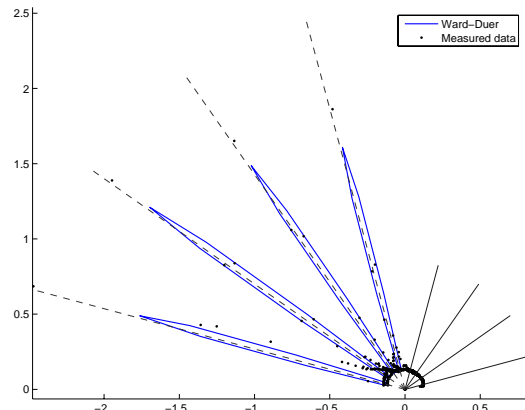
Rendered Images



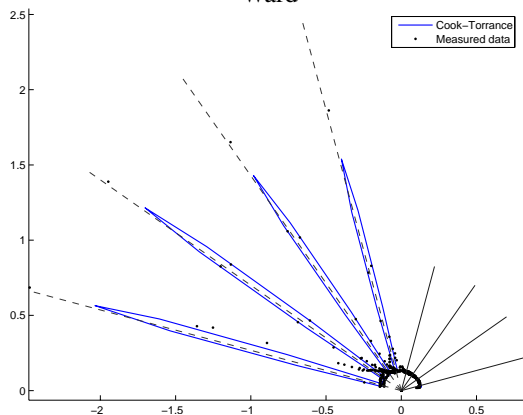
BRDF Plots in the incidence plane (Cubic root applied)



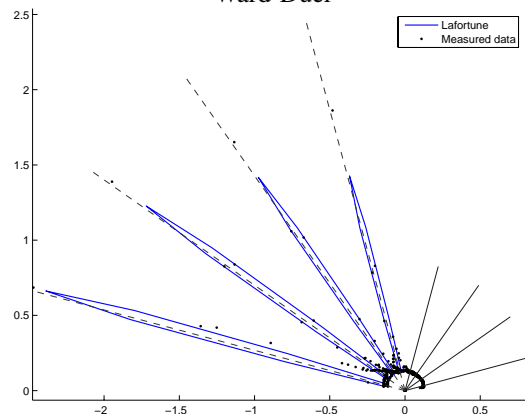
Ward



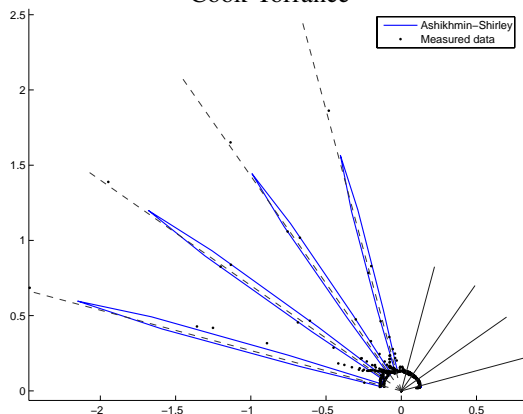
Ward-Duer



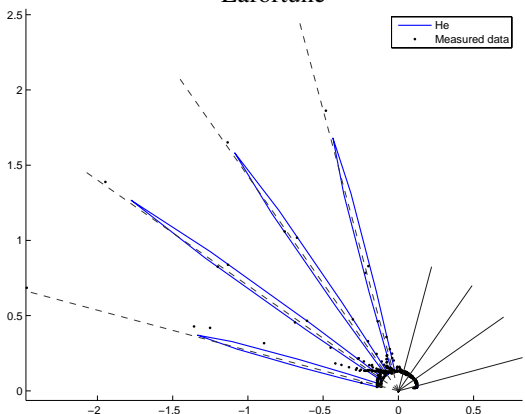
Cook-Torrance



Lafortune



Ashikhmin-Shirley



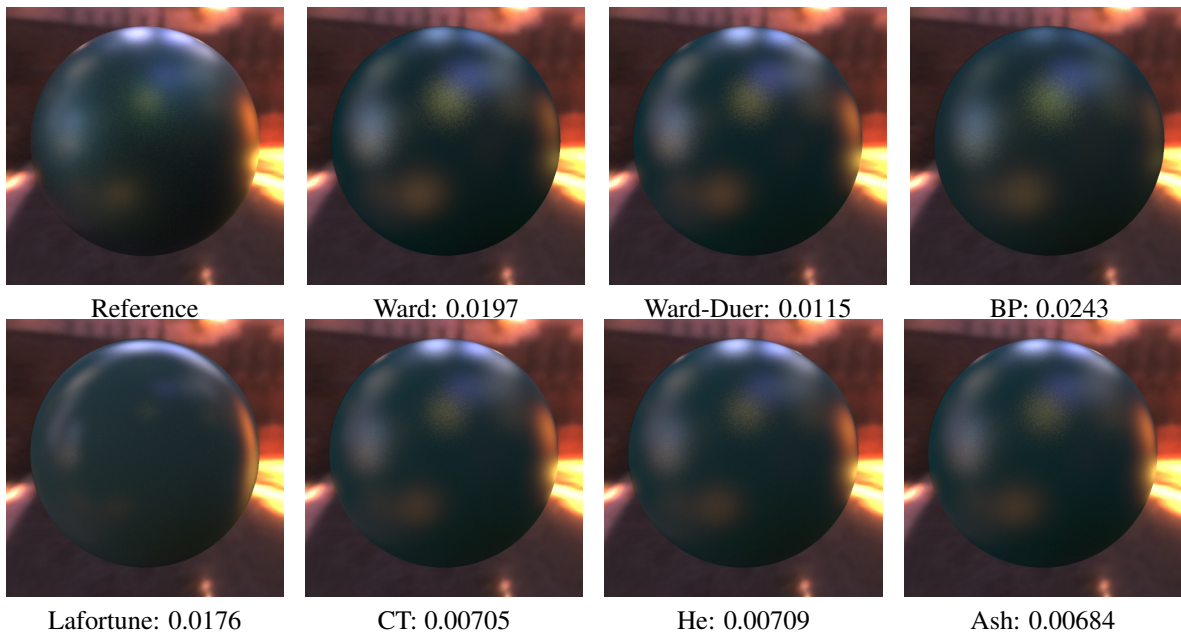
He

Material Name: green-metallic-paint

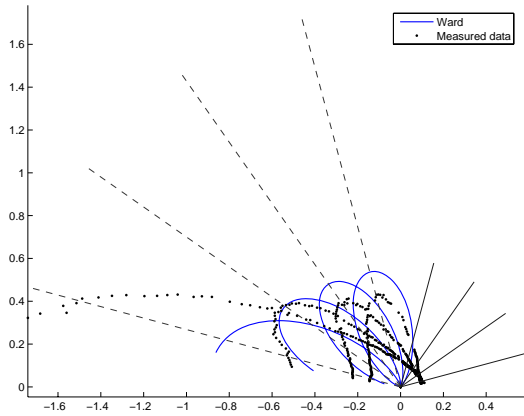
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0	0.028	0.0242	0.0508	0.0655	0.0471	0.158			0.0197
Ward-Duer	0	0.0334	0.0283	0.0346	0.0379	0.0271	0.145			0.0115
Blinn-Phong	0.00479	0.0318	0.0267	0.0126	0.019	0.0138	72			0.0243
Lafortune et al.	0.015	0.0537	0.0428	0.22	0.217	0.153	-0.591	0.548	76	0.0176
Cook-Torrance	0.00303	0.0415	0.0341	0.164	0.165	0.117	0.137	0.143		0.00705
He et al.	0.00318	0.0416	0.0343	0.231	0.232	0.164	28	2.02	1.92	0.00709
Ashikhmin-Shirley	0.000627	0.0388	0.0322	0.207	0.21	0.149	0.146	79.6		0.00684

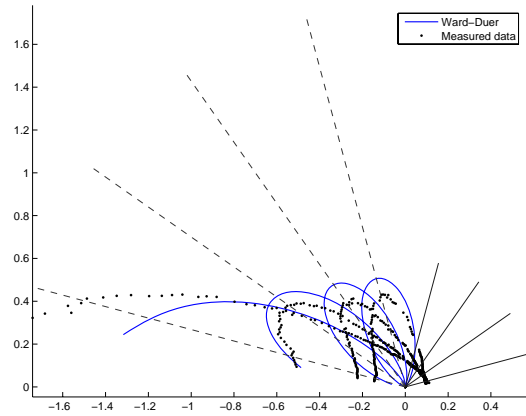
Rendered Images



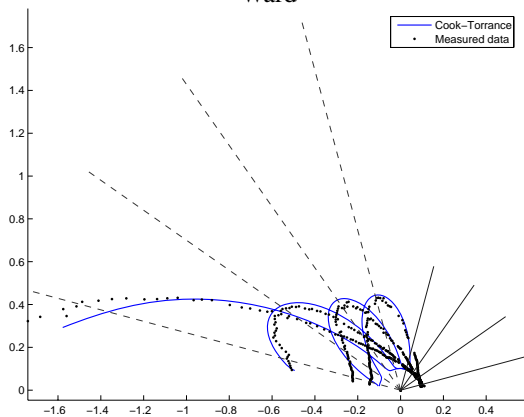
BRDF Plots in the incidence plane (Cubic root applied)



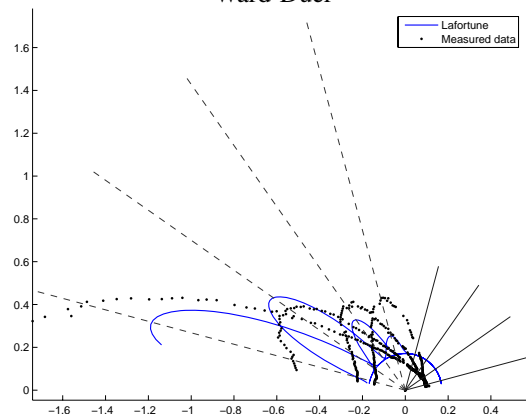
Ward



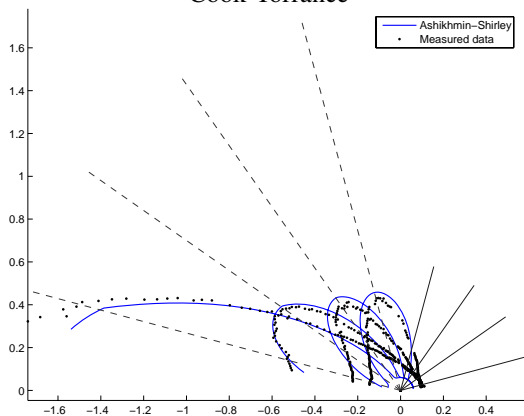
Ward-Duer



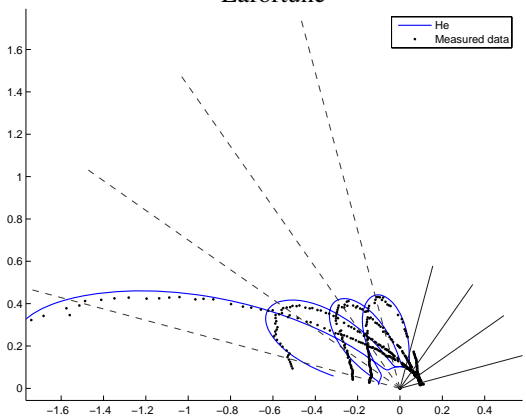
Cook-Torrance



Lafortune



Ashikhmin-Shirley



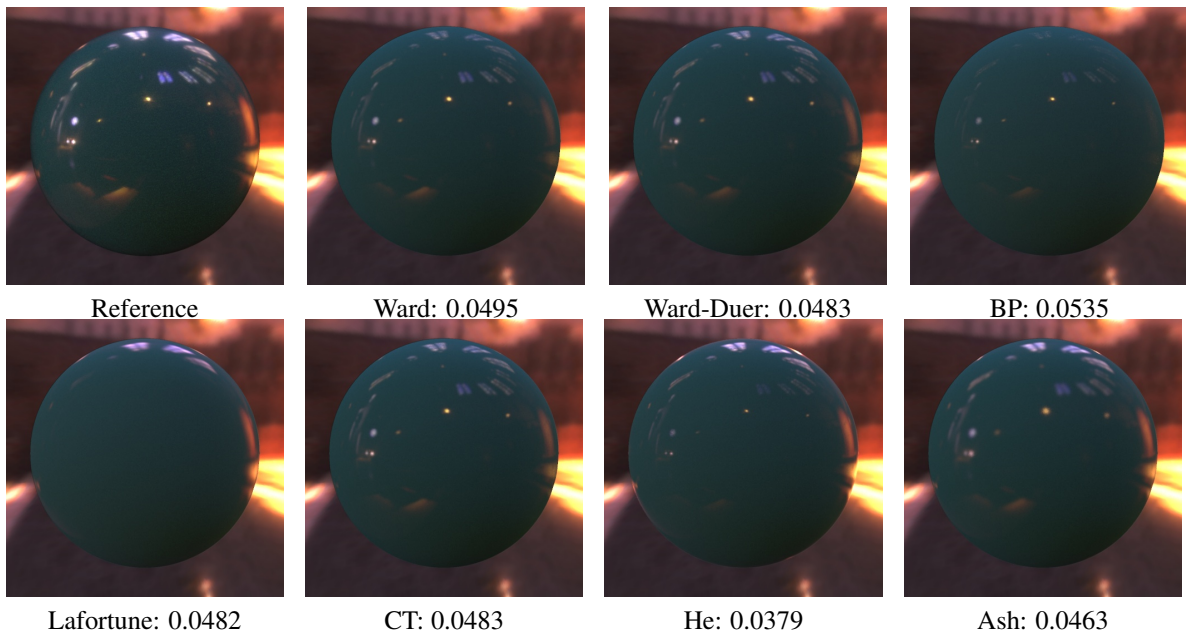
He

Material Name: green-plastic

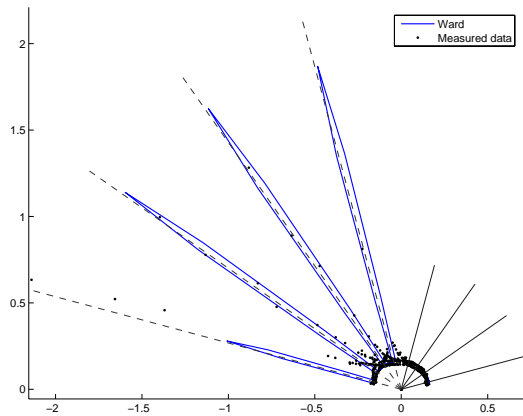
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.0138	0.0695	0.0528	0.0071	0.00476	0.00314	0.00885			0.0495
Ward-Duer	0.0136	0.0694	0.0526	0.0054	0.00359	0.00245	0.00956			0.0483
Blinn-Phong	0.016	0.071	0.0538	0.000998	0.00068	0.000413	8.12e+004			0.0535
Lafortune et al.	0.0168	0.0717	0.054	0.511	0.233	0.224	-0.579	0.575	3.6e+003	0.0482
Cook-Torrance	0.0136	0.0694	0.0526	0.00539	0.00359	0.00245	0.999	0.00954		0.0483
He et al.	0.0149	0.0705	0.0532	1.96e+009	1.1e+009	9.1e+008	52.9	0.0817	1	0.0379
Ashikhmin-Shirley	0.013	0.0693	0.0522	0.0651	0.0382	0.0307	0.0931	6.31e+003		0.0463

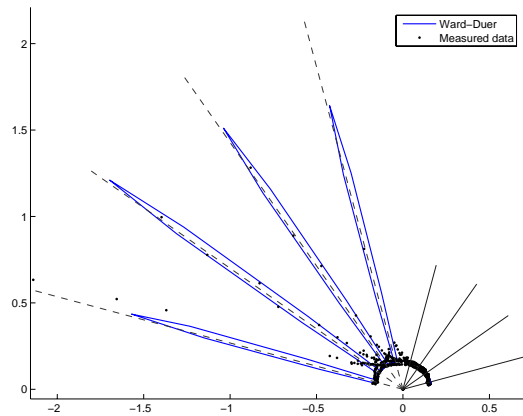
Rendered Images



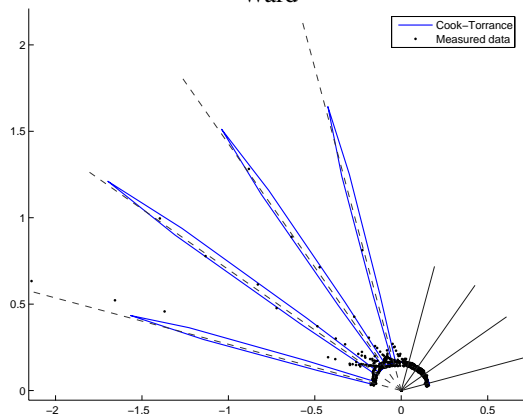
BRDF Plots in the incidence plane (Cubic root applied)



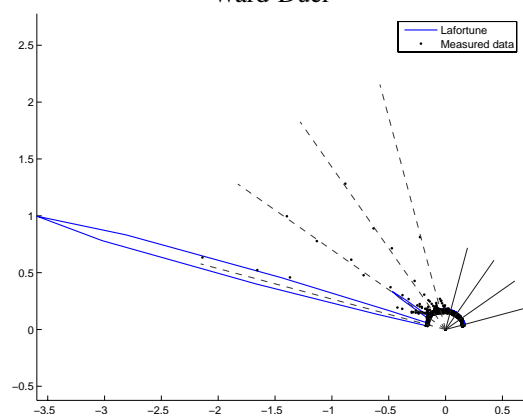
Ward



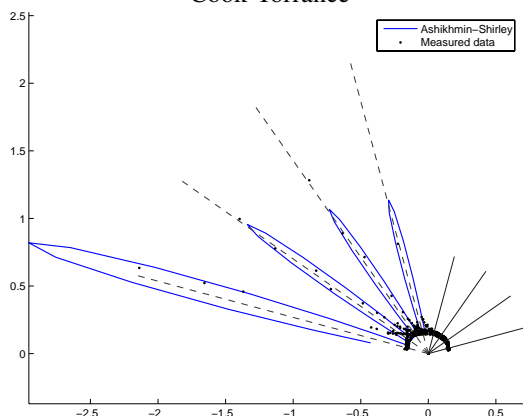
Ward-Duer



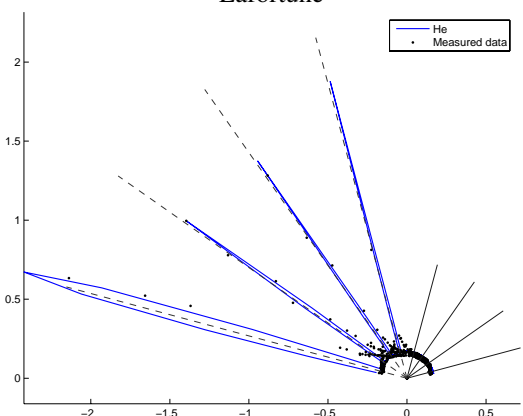
Cook-Torrance



Lafortune



Ashikhmin-Shirley



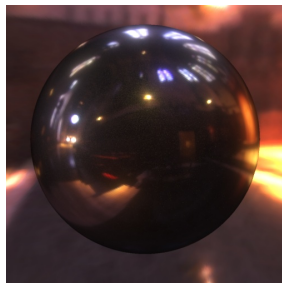
He

Material Name: hematite

Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.0317	0.0275	0.0191	0.0849	0.0739	0.0513	0.00576			0.248
Ward-Duer	0.0366	0.0318	0.0221	0.0601	0.0523	0.0363	0.00509			0.253
Blinn-Phong	0.0307	0.0267	0.0186	0.0269	0.0234	0.0163	5.38e+004			0.282
Lafortune et al.	0.03	0.0261	0.0181	0.0802	0.0698	0.0484	-0.577	0.577	1.66e+004	0.289
Cook-Torrance	0.0364	0.0316	0.022	0.102	0.0889	0.0617	0.599	0.00512		0.251
He et al.	0.0285	0.0248	0.0172	0.163	0.142	0.0985	69	0.208	4.89	0.228
Ashikhmin-Shirley	0.0368	0.032	0.0222	0.0599	0.0521	0.0362	0.999	7.82e+004		0.253

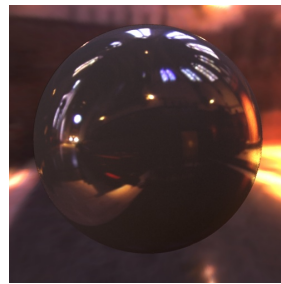
Rendered Images



Reference



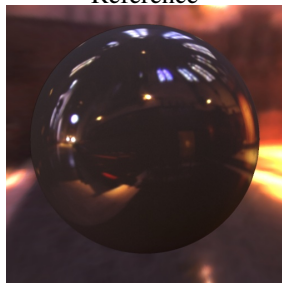
Ward: 0.248



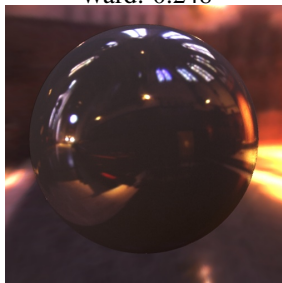
Ward-Duer: 0.253



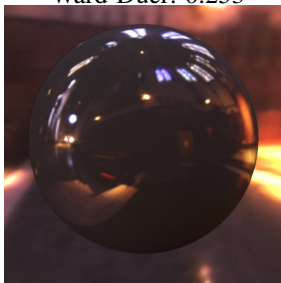
BP: 0.282



Lafortune: 0.289



CT: 0.251

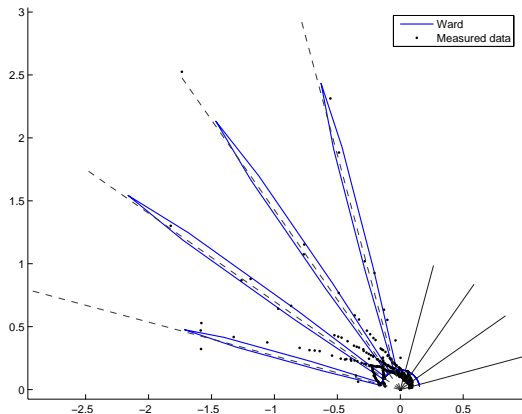


He: 0.228

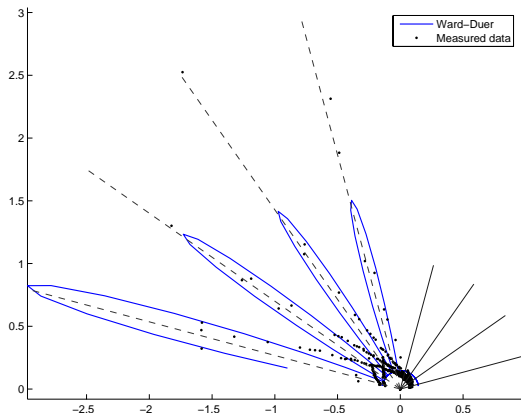


Ash: 0.253

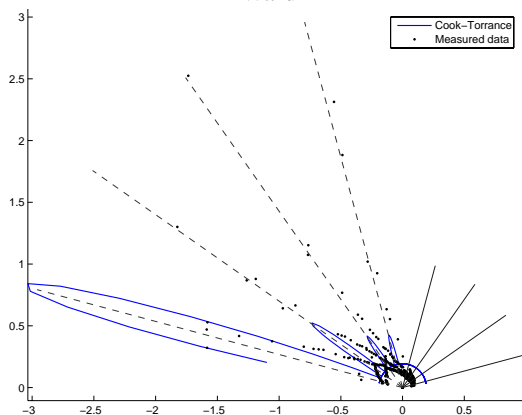
BRDF Plots in the incidence plane (Cubic root applied)



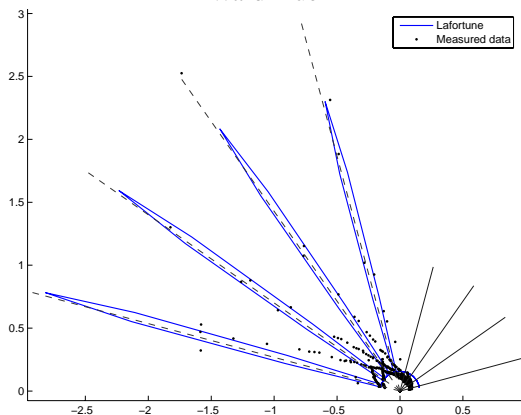
Ward



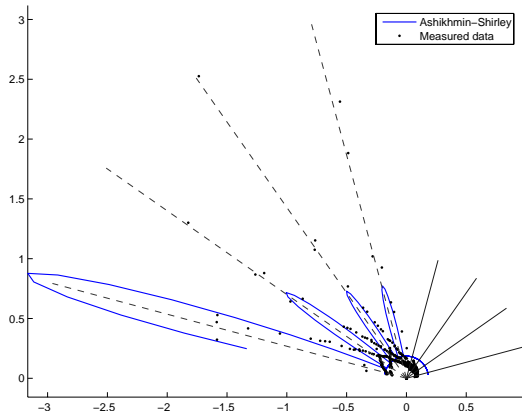
Ward-Duer



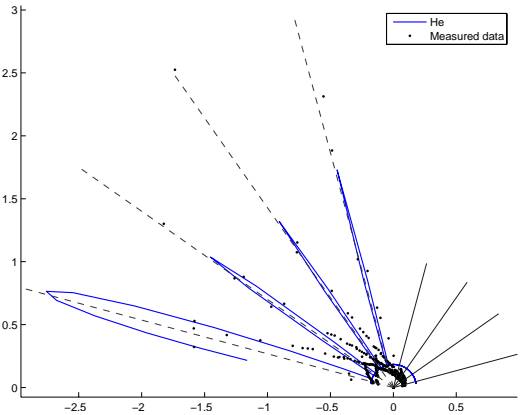
Cook-Torrance



Lafortune



Ashikhmin-Shirley



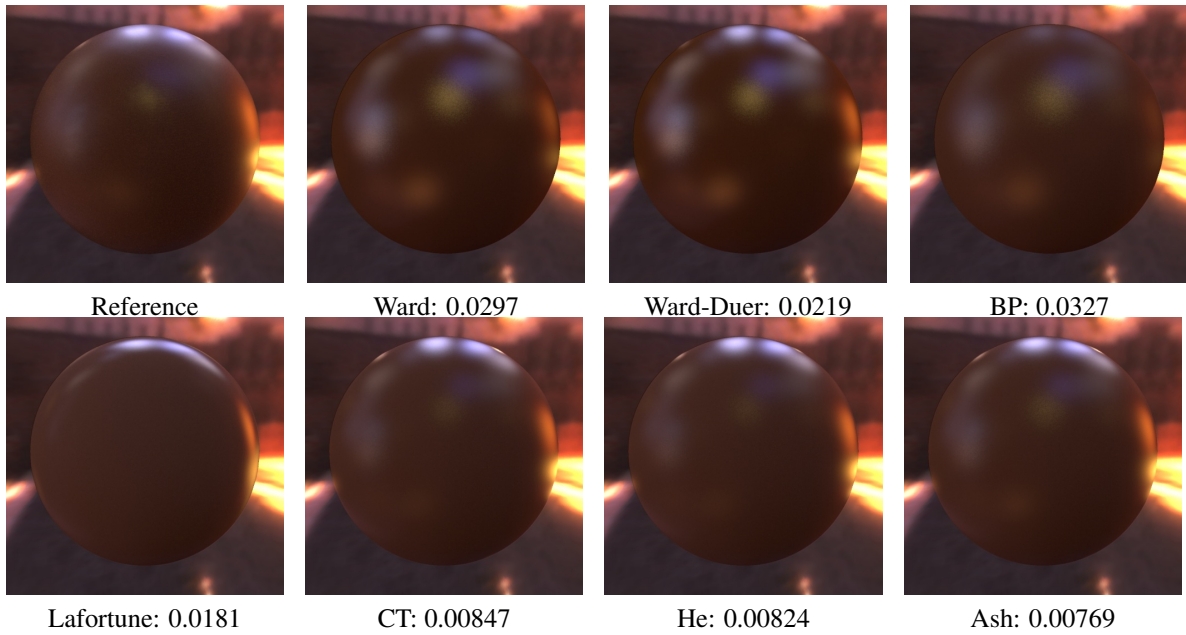
He

Material Name: ipswich-pine-221

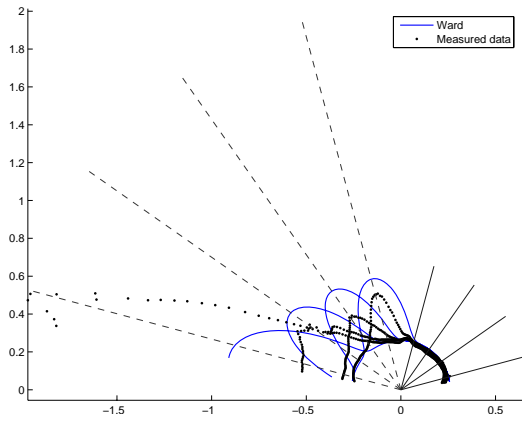
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.0533	0.0155	0.00271	0.0414	0.0355	0.025	0.13			0.0297
Ward-Duer	0.0506	0.0133	0.00112	0.0313	0.0267	0.0189	0.119			0.0219
Blinn-Phong	0.0591	0.0204	0.0062	0.0102	0.00878	0.00617	85.1			0.0327
Lafortune et al.	0.0722	0.0317	0.0141	0.53	0.451	0.319	-0.595	0.541	167	0.0181
Cook-Torrance	0.065	0.0256	0.00981	0.312	0.265	0.188	0.0192	0.12		0.00847
He et al.	0.0654	0.026	0.01	0.458	0.389	0.276	24	1.46	1.25	0.00824
Ashikhmin-Shirley	0.0628	0.0238	0.0085	0.334	0.284	0.201	0.0333	116		0.00769

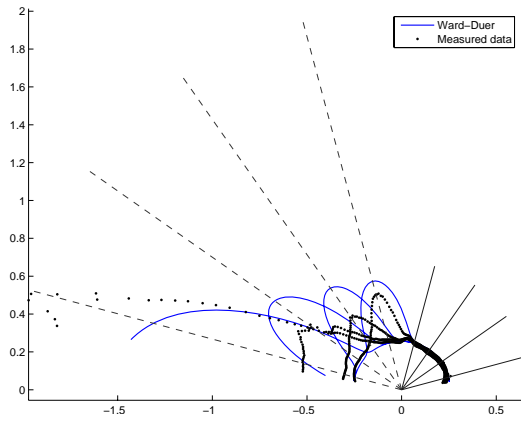
Rendered Images



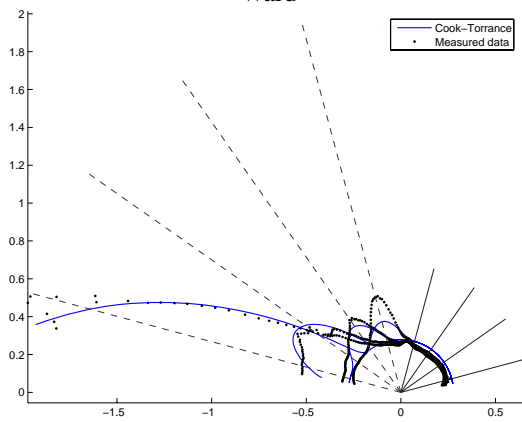
BRDF Plots in the incidence plane (Cubic root applied)



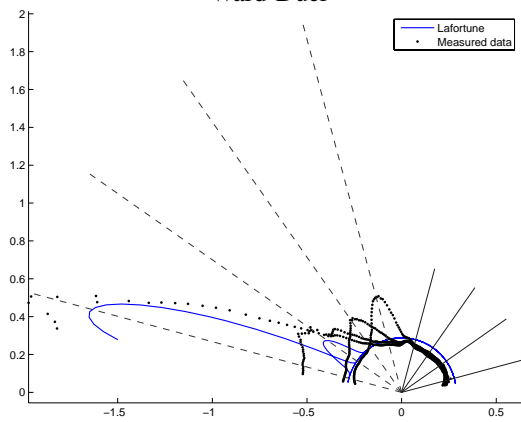
Ward



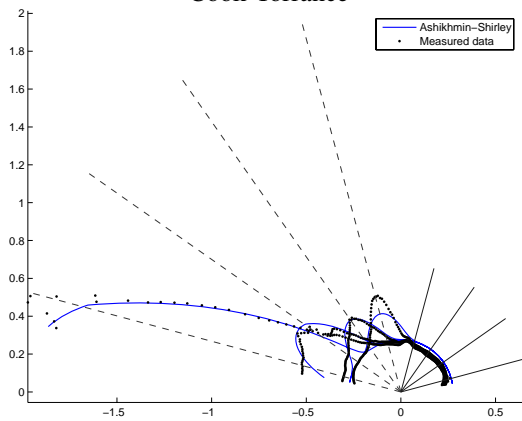
Ward-Duer



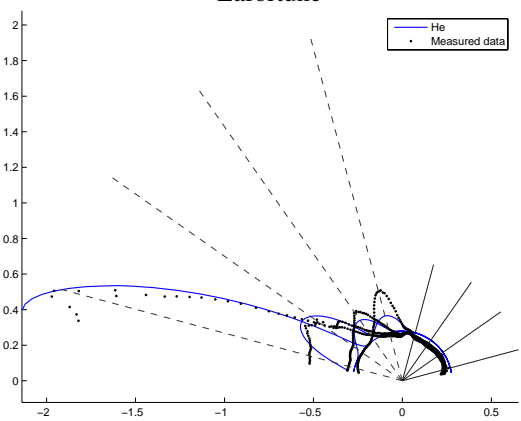
Cook-Torrance



Lafortune



Ashikhmin-Shirley



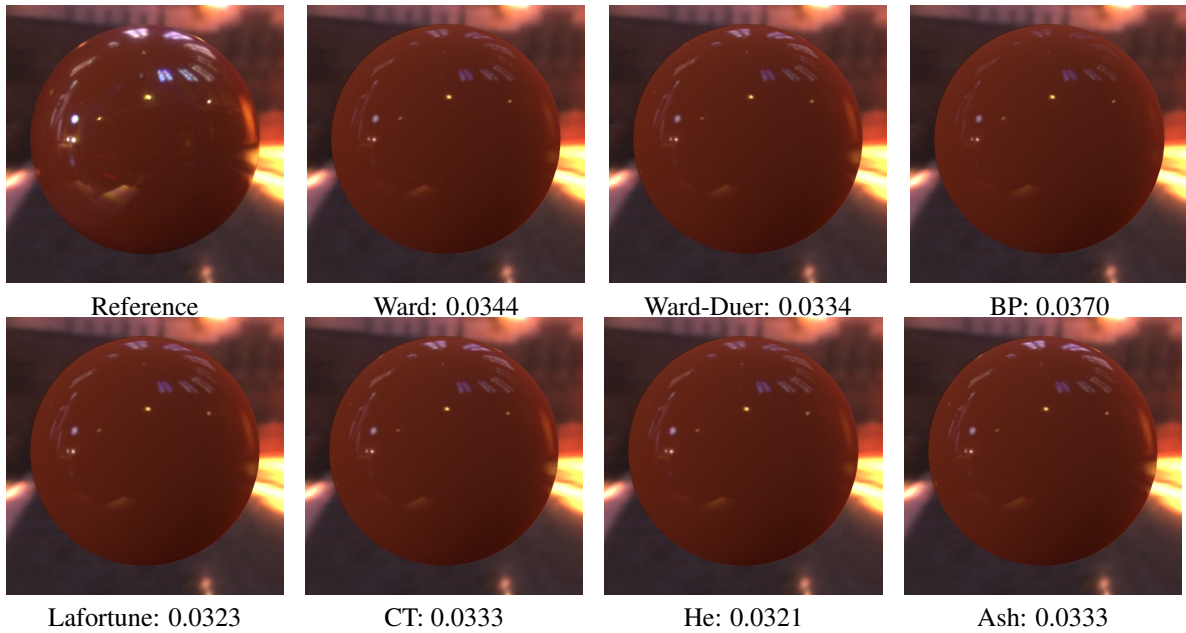
He

Material Name: maroon-bball

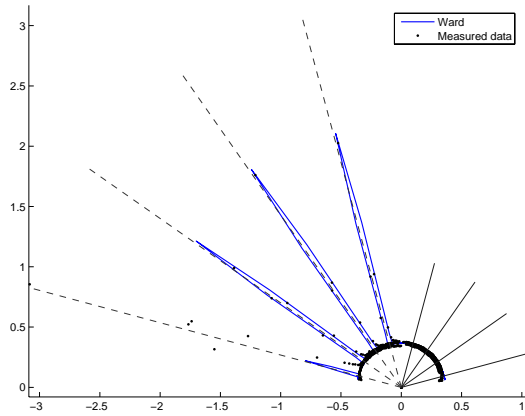
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.151	0.0225	0.00481	0.00745	0.00451	0.00302	0.00756			0.0344
Ward-Duer	0.151	0.0225	0.00485	0.00532	0.00328	0.00219	0.00726			0.0334
Blinn-Phong	0.152	0.023	0.00514	0.00197	0.00116	0.000782	4.48e+004			0.037
Lafortune et al.	0.151	0.0221	0.00447	0.0146	0.0092	0.00643	-0.577	0.577	7.76e+003	0.0323
Cook-Torrance	0.151	0.0226	0.00486	0.019	0.0117	0.00786	0.271	0.00716		0.0333
He et al.	0.151	0.0223	0.00468	0.00826	0.00506	0.00338	50	0.205	15	0.0321
Ashikhmin-Shirley	0.151	0.0226	0.00487	0.0295	0.0182	0.0123	0.169	4e+004		0.0333

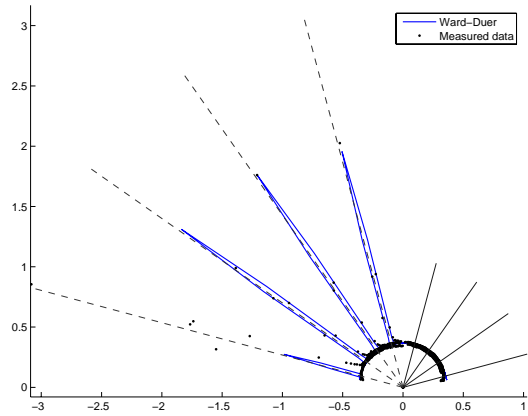
Rendered Images



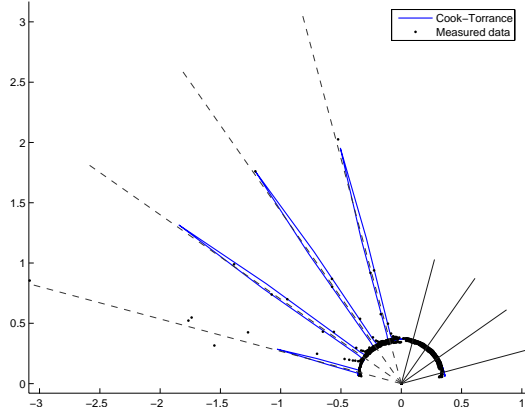
BRDF Plots in the incidence plane (Cubic root applied)



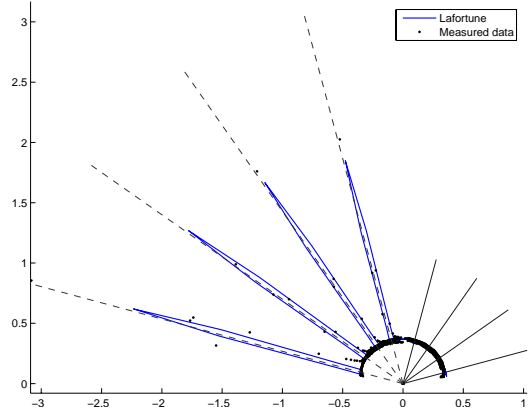
Ward



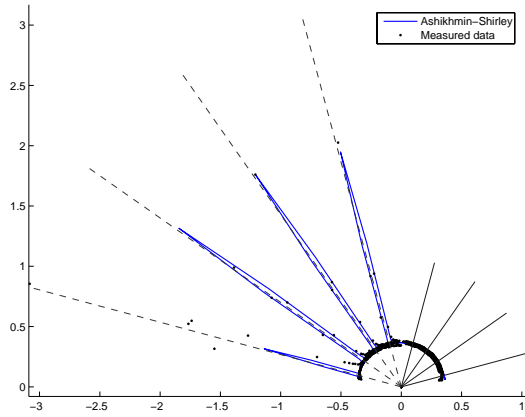
Ward-Duer



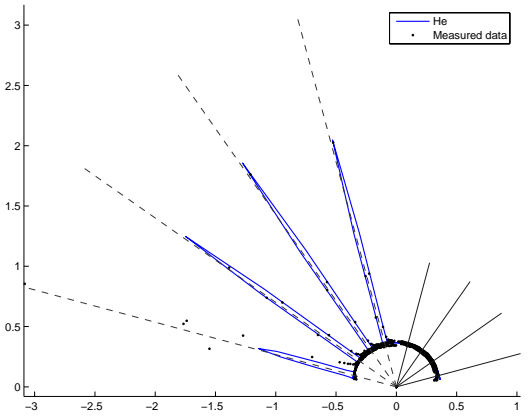
Cook-Torrance



Lafortune



Ashikhmin-Shirley



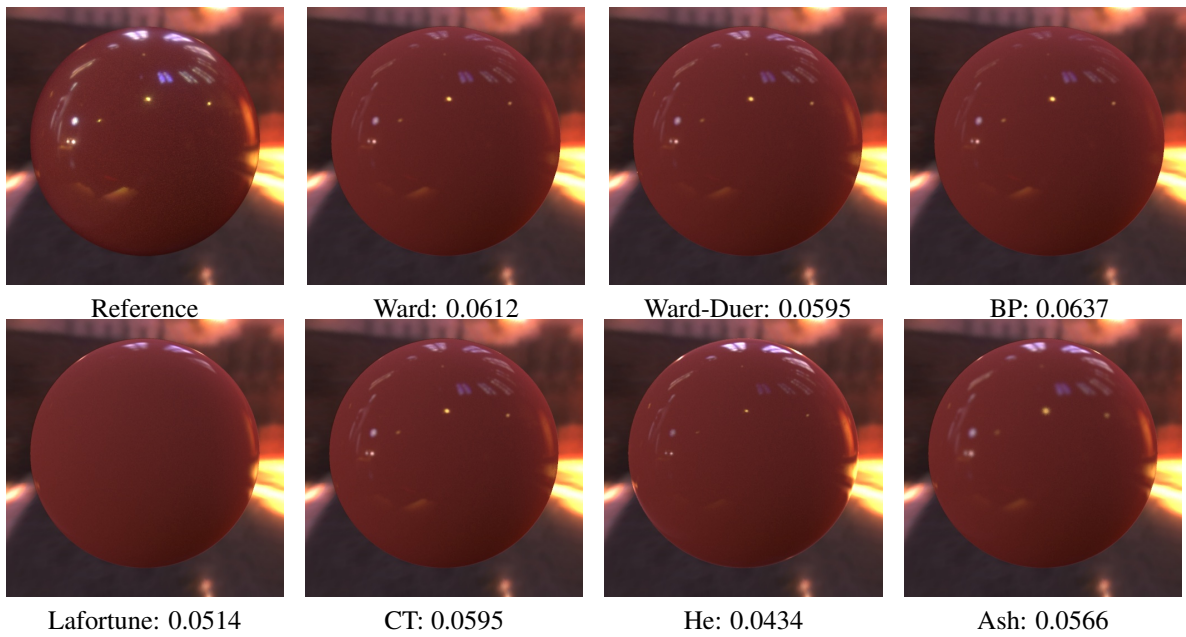
He

Material Name: maroon-plastic

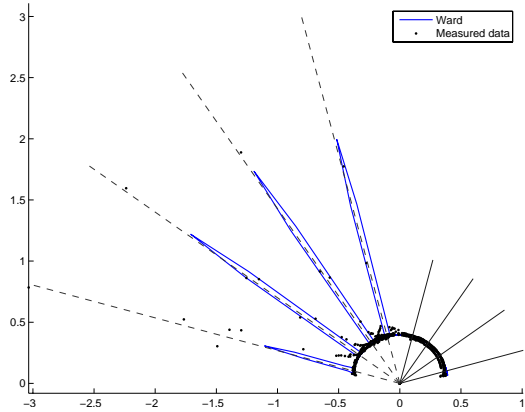
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.191	0.0301	0.0187	0.00873	0.00521	0.0035	0.00892			0.0612
Ward-Duer	0.191	0.0299	0.0185	0.00653	0.00402	0.00272	0.00941			0.0595
Blinn-Phong	0.191	0.0302	0.0187	0.00289	0.00171	0.00117	2.01e+004			0.0637
Lafortune et al.	0.195	0.0326	0.0203	0.853	0.525	0.381	-0.578	0.576	7.21e+003	0.0514
Cook-Torrance	0.191	0.0299	0.0185	0.00654	0.00402	0.00272	0.999	0.0094		0.0595
He et al.	0.192	0.0307	0.019	7.52e+007	5.13e+007	3.56e+007	56.3	0.1	1	0.0434
Ashikhmin-Shirley	0.19	0.0293	0.018	0.076	0.0522	0.0367	0.0887	5.83e+003		0.0566

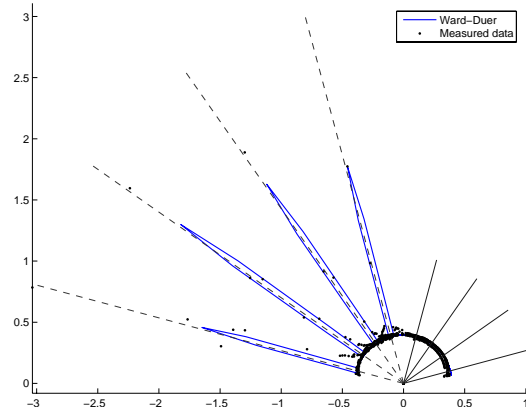
Rendered Images



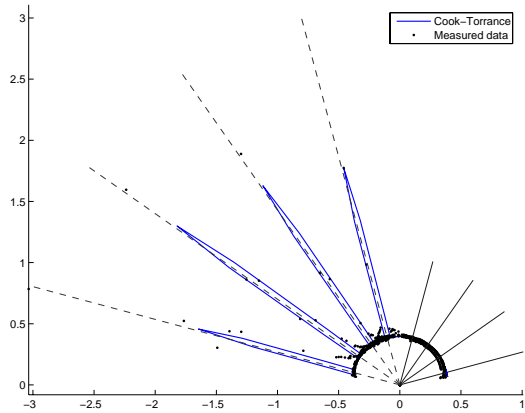
BRDF Plots in the incidence plane (Cubic root applied)



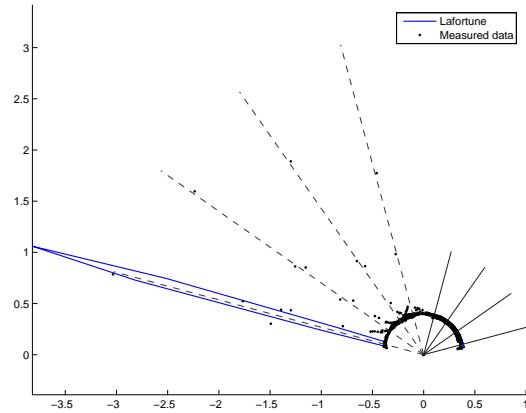
Ward



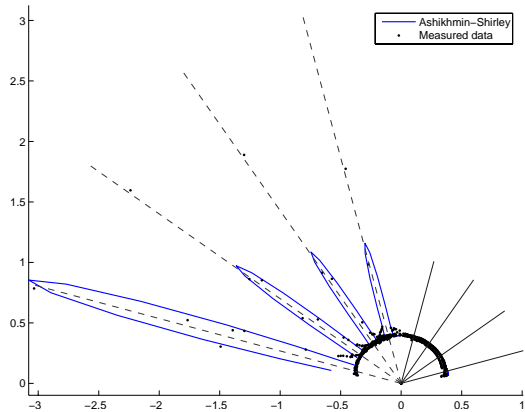
Ward-Duer



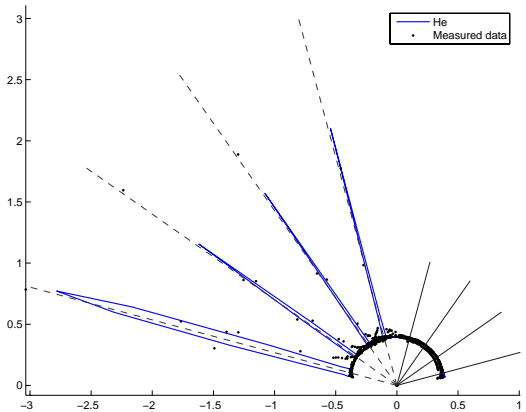
Cook-Torrance



Lafortune



Ashikhmin-Shirley



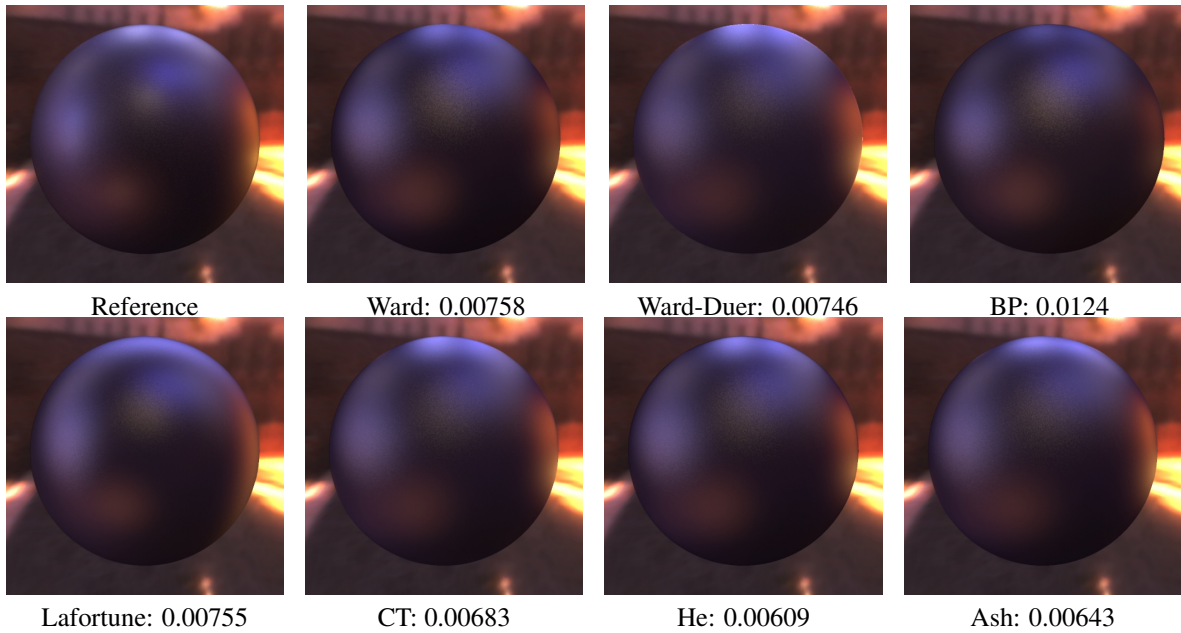
He

Material Name: metallic-blue

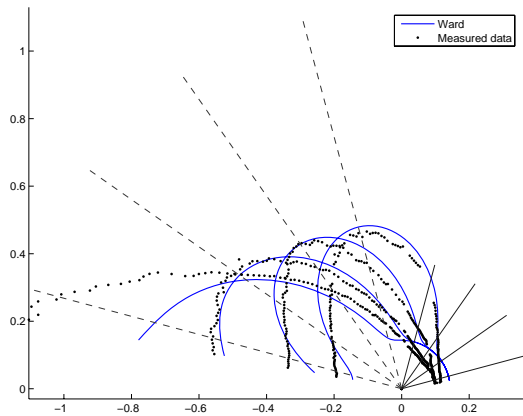
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.00878	0.0046	0.0144	0.081	0.0664	0.1	0.239			0.00758
Ward-Duer	0.0153	0.00994	0.0271	0.0472	0.0386	0.0524	0.245			0.00746
Blinn-Phong	0.0152	0.00973	0.0177	0.0216	0.0177	0.0291	39.3			0.0124
Lafortune et al.	0.0146	0.00932	0.0209	0.129	0.105	0.16	-0.594	0.542	13.7	0.00755
Cook-Torrance	0.0135	0.00848	0.0244	0.0719	0.0589	0.0813	0.638	0.231		0.00683
He et al.	0.0104	0.00591	0.0195	0.0875	0.0717	0.102	7.99	0.926	9.1	0.00609
Ashikhmin-Shirley	0.00983	0.00553	0.0204	0.0606	0.0495	0.0684	0.999	28.1		0.00643

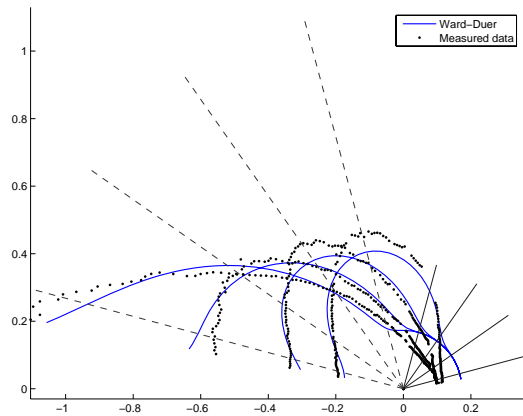
Rendered Images



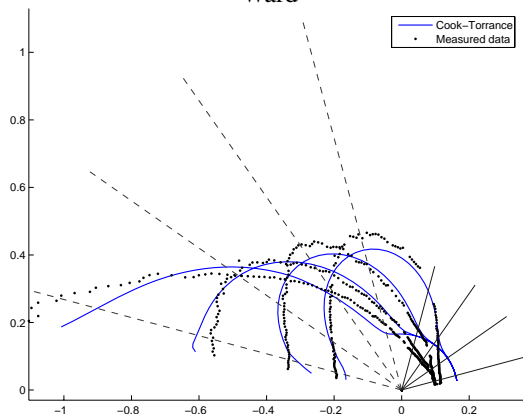
BRDF Plots in the incidence plane (Cubic root applied)



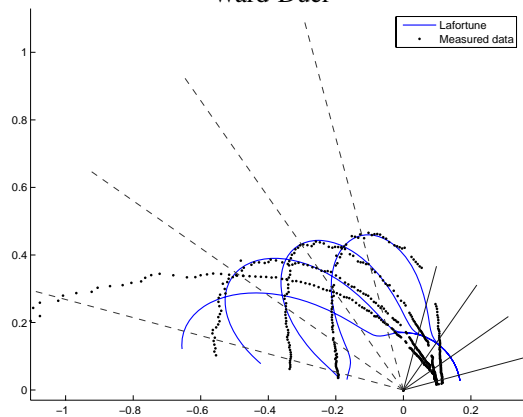
Ward



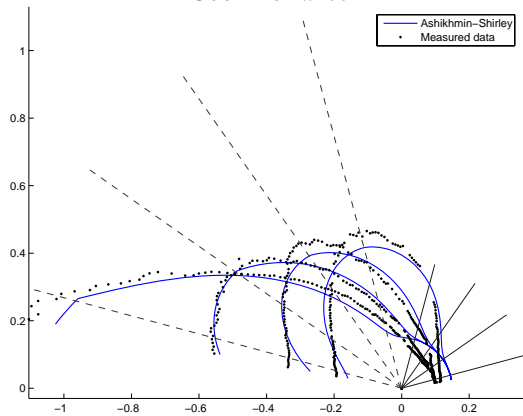
Ward-Duer



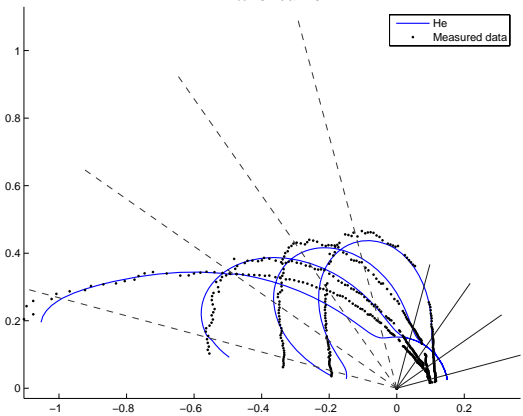
Cook-Torrance



Lafortune



Ashikhmin-Shirley



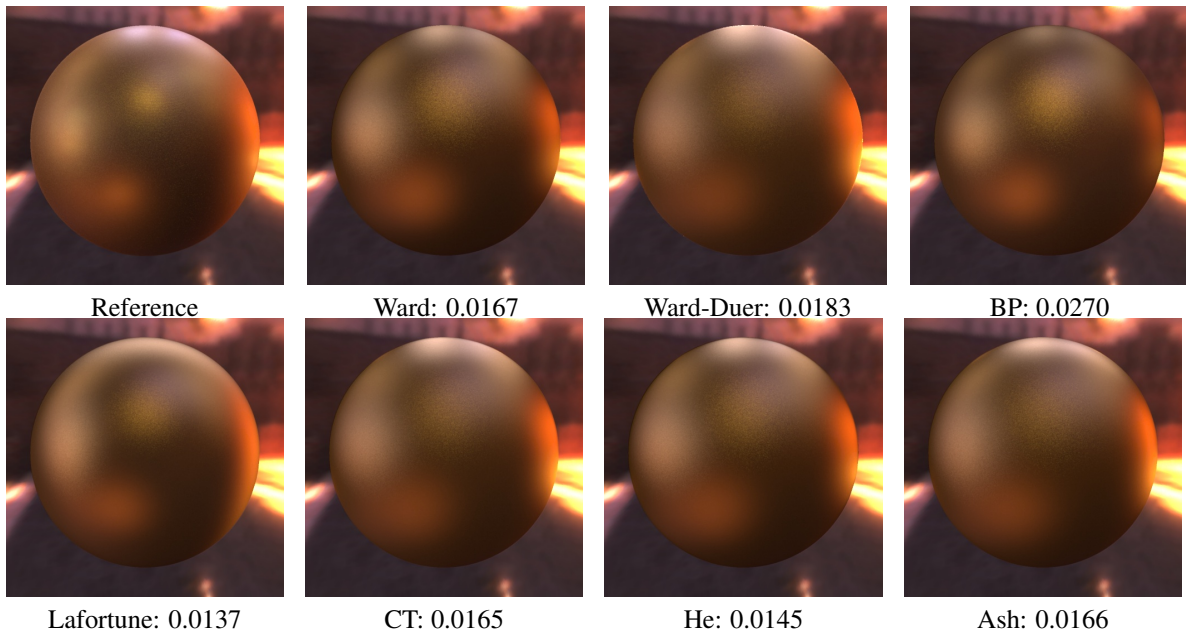
He

Material Name: metallic-gold

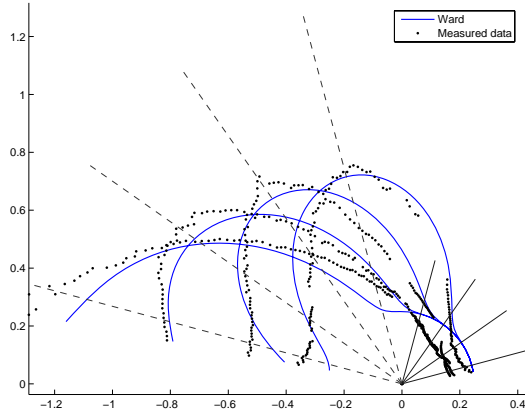
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.0468	0.0203	0.00167	0.279	0.163	0.0425	0.243			0.0167
Ward-Duer	0.0712	0.0342	0.00286	0.16	0.0931	0.0274	0.26			0.0183
Blinn-Phong	0.069	0.0323	0.00638	0.0738	0.0434	0.0104	41.9			0.027
Lafortune et al.	0.0601	0.0298	0.00487	0.475	0.27	0.0681	-0.596	0.537	12.8	0.0137
Cook-Torrance	0.0657	0.0312	0.00247	0.231	0.135	0.0387	0.663	0.241		0.0165
He et al.	0.0513	0.023	0.000938	0.303	0.176	0.049	7.96	0.966	9.1	0.0145
Ashikhmin-Shirley	0.0532	0.024	0.000309	0.205	0.12	0.0345	0.999	25.4		0.0166

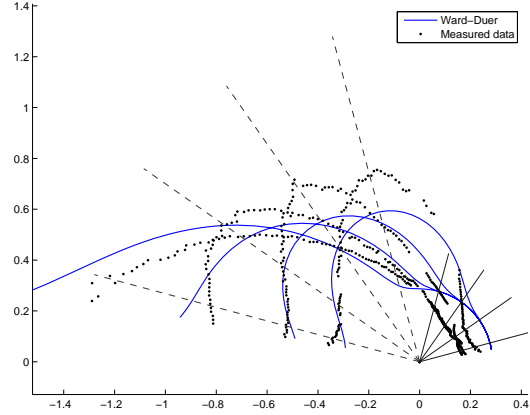
Rendered Images



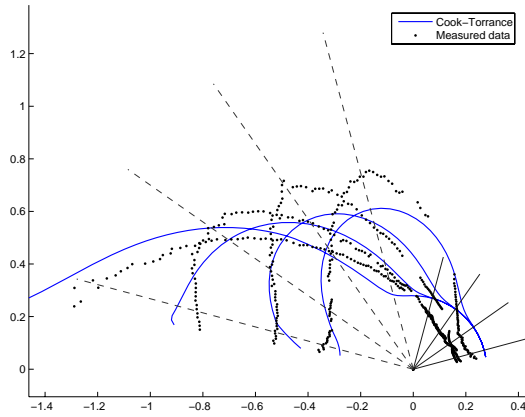
BRDF Plots in the incidence plane (Cubic root applied)



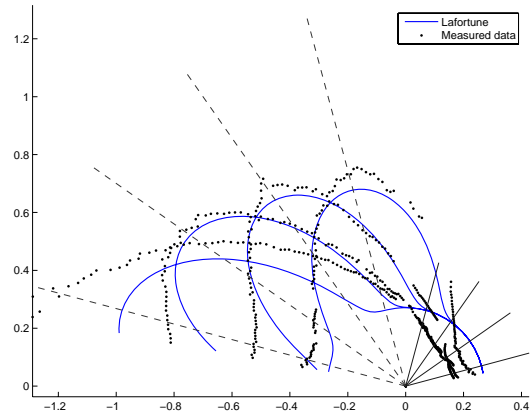
Ward



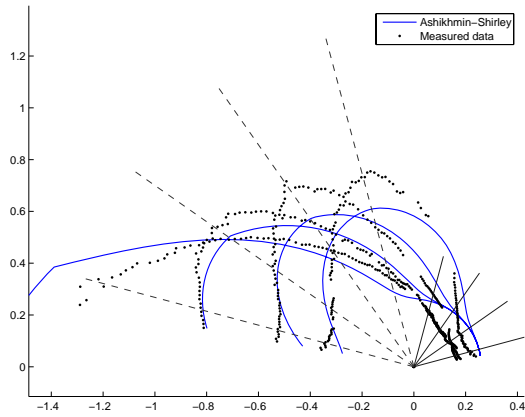
Ward-Duer



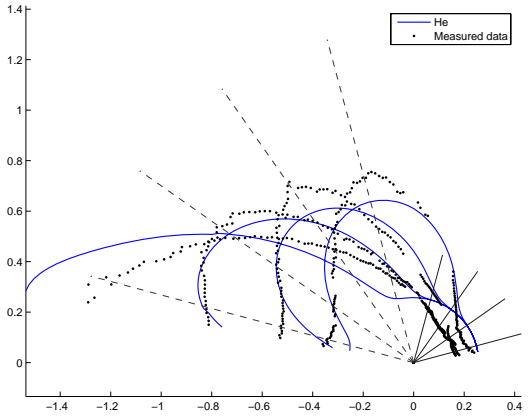
Cook-Torrance



Lafortune



Ashikhmin-Shirley



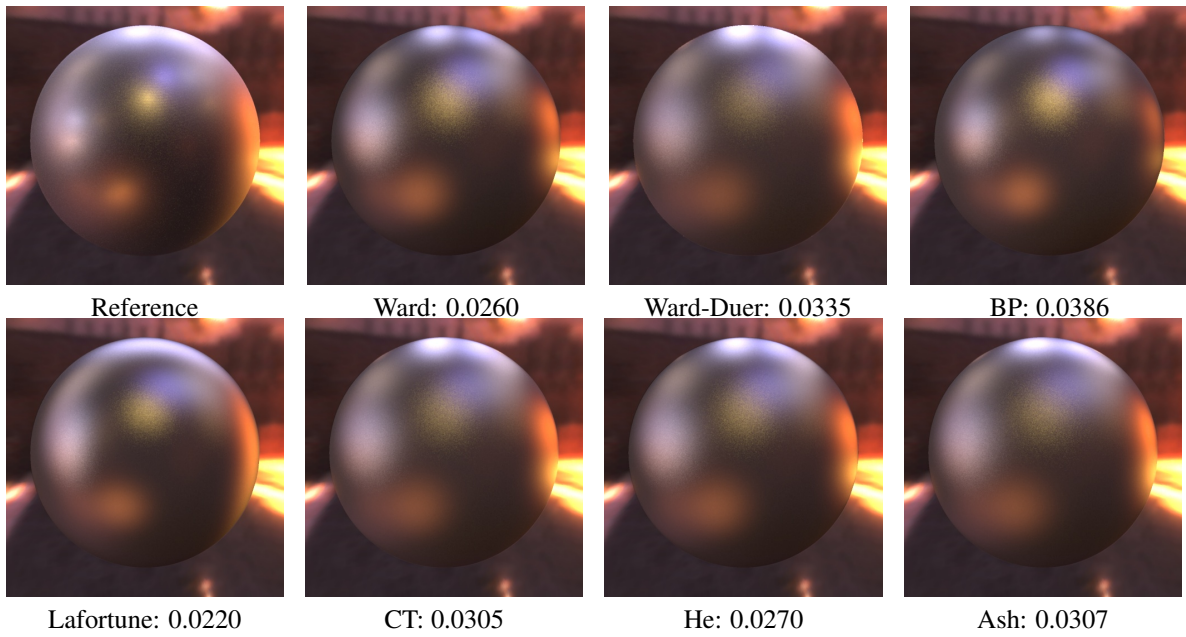
He

Material Name: metallic-silver

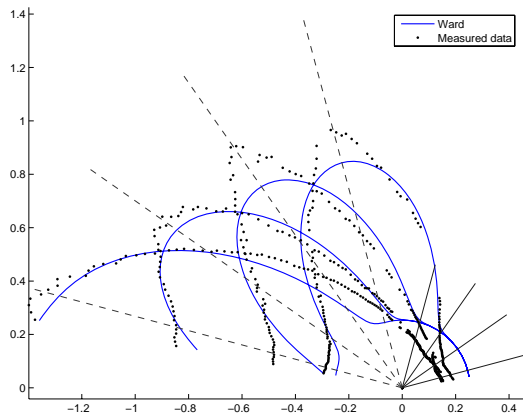
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.049	0.045	0.0325	0.269	0.225	0.151	0.185			0.026
Ward-Duer	0.0703	0.062	0.0437	0.159	0.133	0.0896	0.208			0.0335
Blinn-Phong	0.0695	0.0628	0.0446	0.0742	0.0615	0.0412	75			0.0386
Lafortune et al.	0.0552	0.05	0.0359	0.434	0.363	0.243	-0.587	0.559	21.4	0.022
Cook-Torrance	0.0652	0.0579	0.041	0.238	0.2	0.134	0.661	0.195		0.0305
He et al.	0.0524	0.0473	0.0339	0.301	0.252	0.169	12	1.17	9.1	0.027
Ashikhmin-Shirley	0.0547	0.0491	0.035	0.197	0.166	0.111	0.999	40.5		0.0307

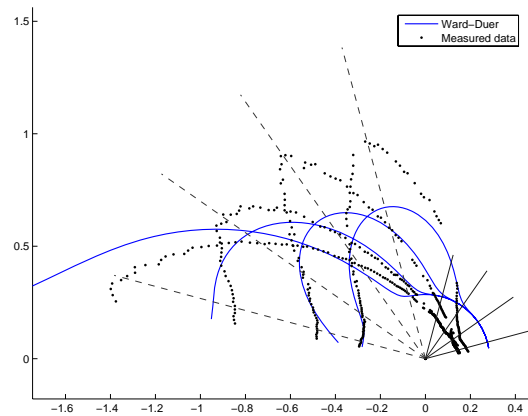
Rendered Images



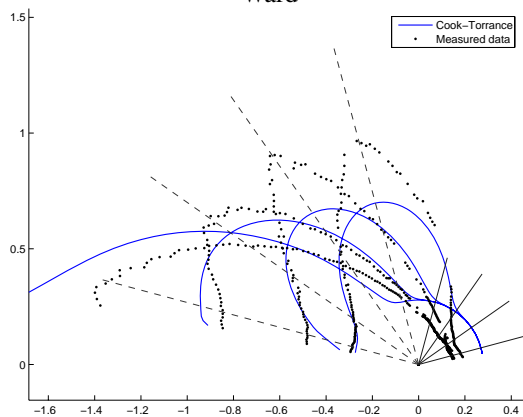
BRDF Plots in the incidence plane (Cubic root applied)



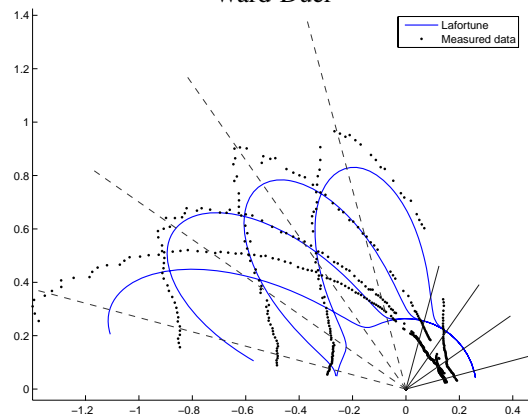
Ward



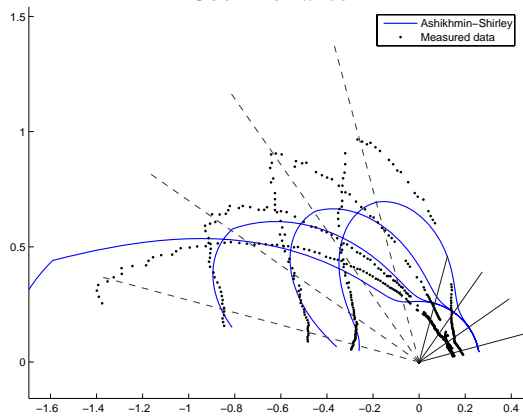
Ward-Duer



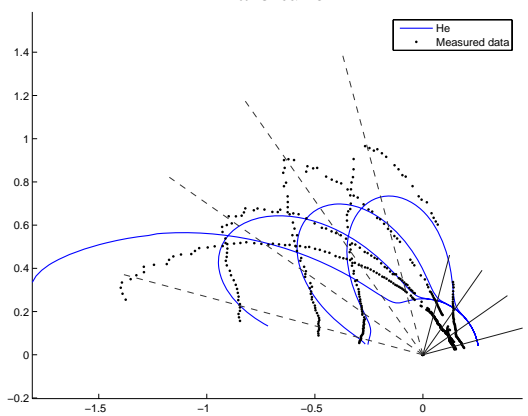
Cook-Torrance



Lafortune



Ashikhmin-Shirley



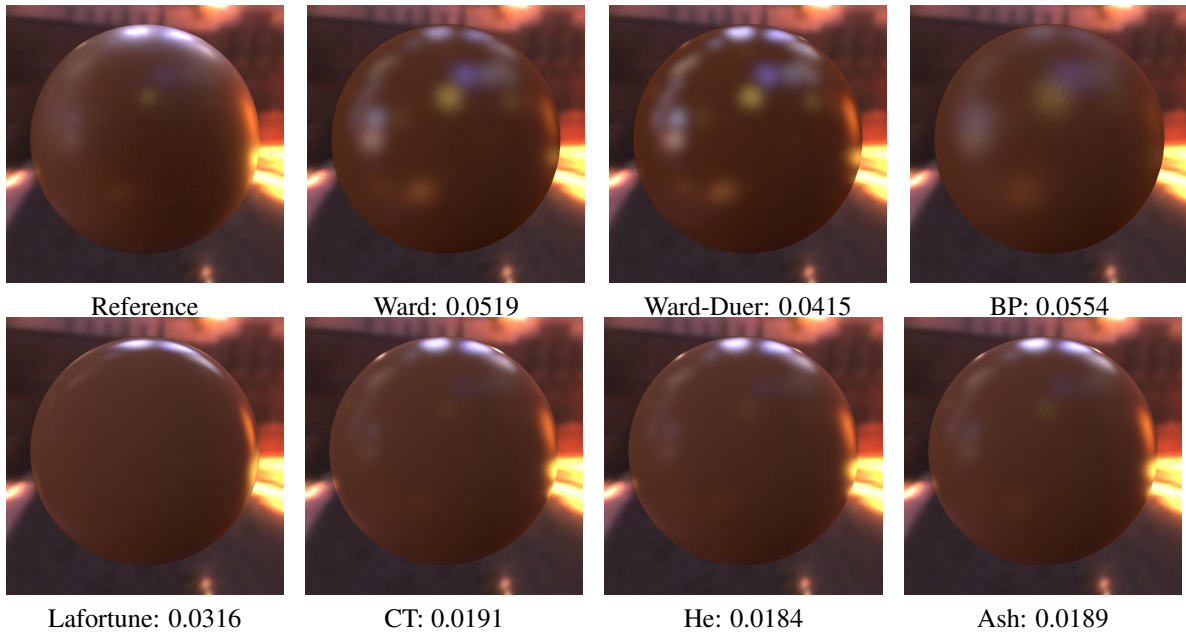
He

Material Name: natural-209

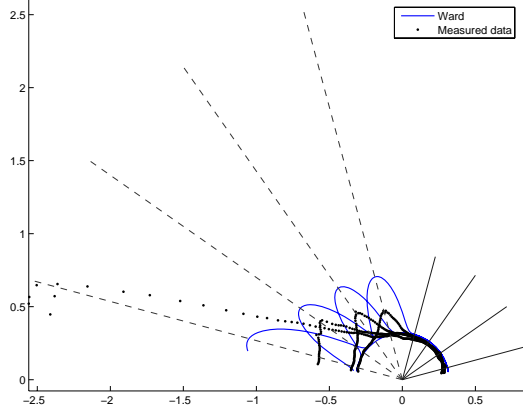
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.0992	0.0328	0.00789	0.0409	0.0357	0.0241	0.0978			0.0519
Ward-Duer	0.0958	0.0296	0.00575	0.0319	0.0282	0.0189	0.0845			0.0415
Blinn-Phong	0.102	0.036	0.00995	0.0117	0.00997	0.00676	92.9			0.0554
Lafortune et al.	0.118	0.049	0.0188	0.873	0.778	0.517	-0.591	0.549	274	0.0316
Cook-Torrance	0.114	0.0455	0.0165	0.595	0.532	0.356	0.00414	0.0874		0.0191
He et al.	0.113	0.0449	0.0161	0.714	0.639	0.427	28	1.25	1.14	0.0184
Ashikhmin-Shirley	0.112	0.044	0.0155	0.374	0.334	0.223	0.0123	230		0.0189

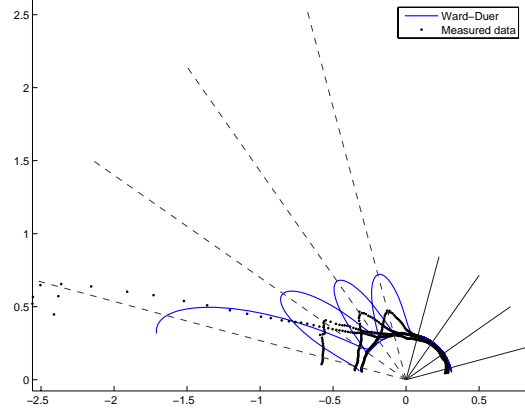
Rendered Images



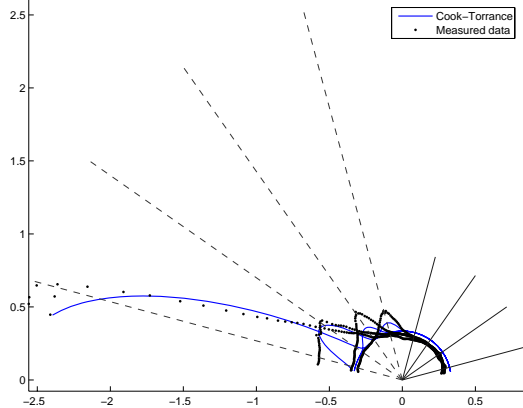
BRDF Plots in the incidence plane (Cubic root applied)



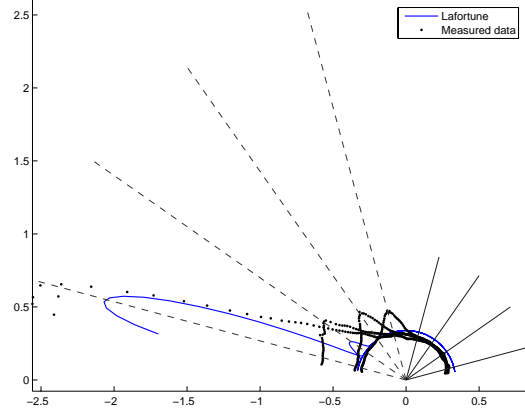
Ward



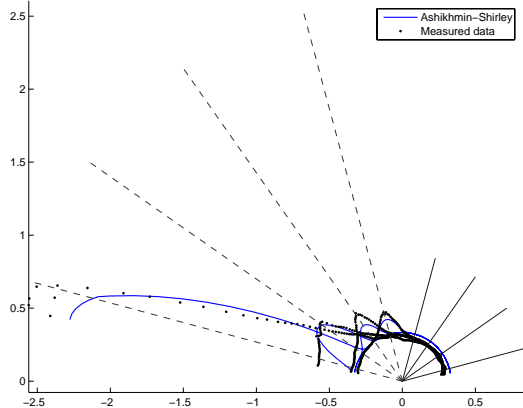
Ward-Duer



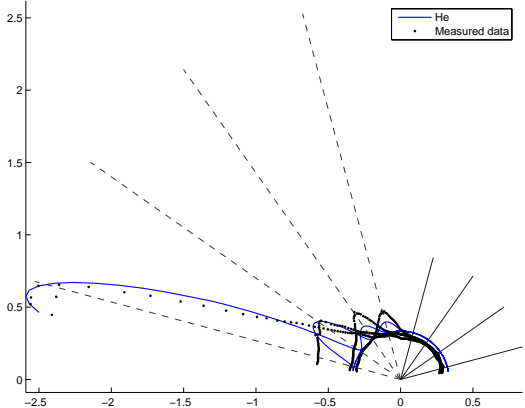
Cook-Torrance



Lafortune



Ashikhmin-Shirley



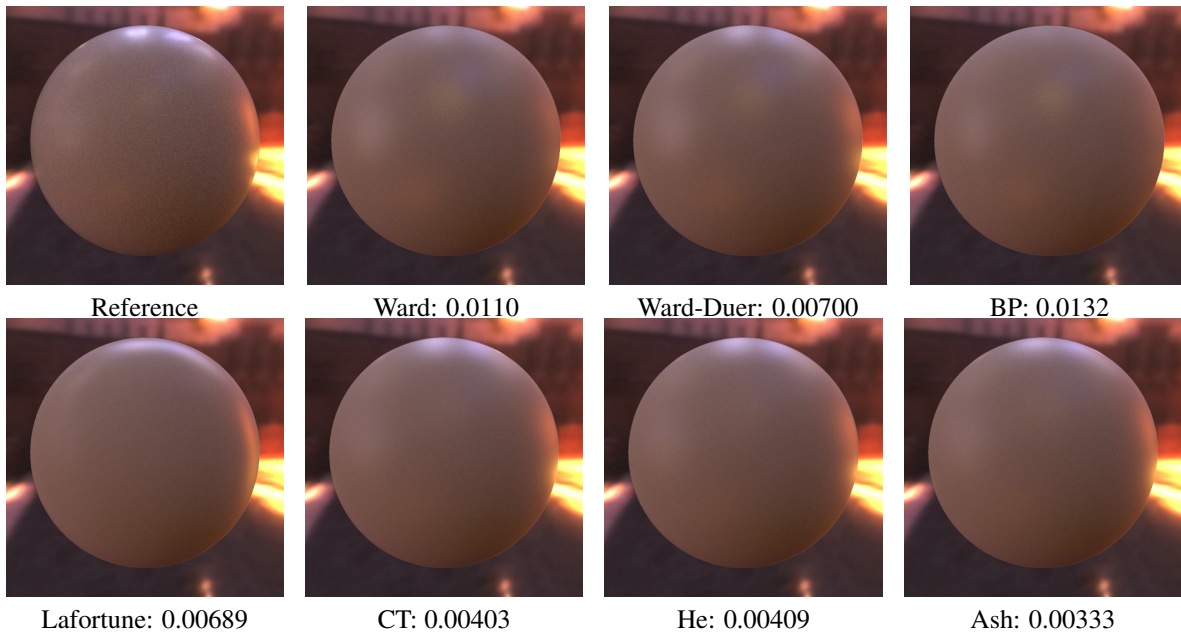
He

Material Name: neoprene-rubber

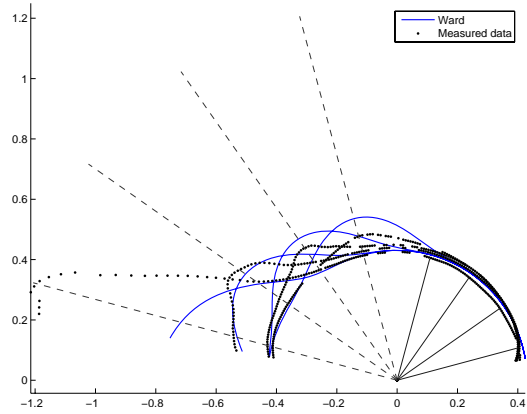
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.244	0.18	0.102	0.0367	0.0305	0.0195	0.183			0.011
Ward-Duer	0.244	0.18	0.101	0.0251	0.0205	0.0135	0.177			0.007
Blinn-Phong	0.252	0.186	0.106	0.00732	0.00617	0.00381	83			0.0132
Lafortune et al.	0.258	0.192	0.109	0.197	0.155	0.105	-0.599	0.531	65.6	0.00689
Cook-Torrance	0.249	0.184	0.104	0.15	0.12	0.0813	0.09	0.191		0.00403
He et al.	0.249	0.184	0.104	0.233	0.187	0.126	12	1.17	1.66	0.00409
Ashikhmin-Shirley	0.246	0.182	0.102	0.22	0.176	0.119	0.0984	41.6		0.00333

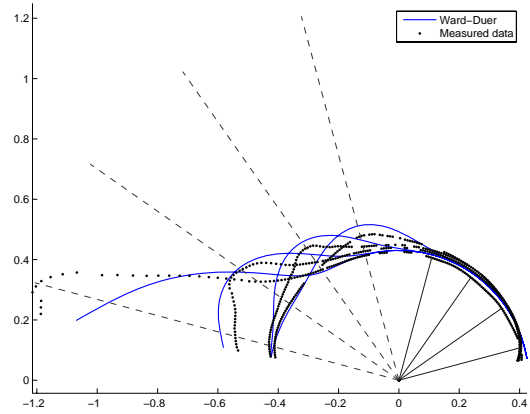
Rendered Images



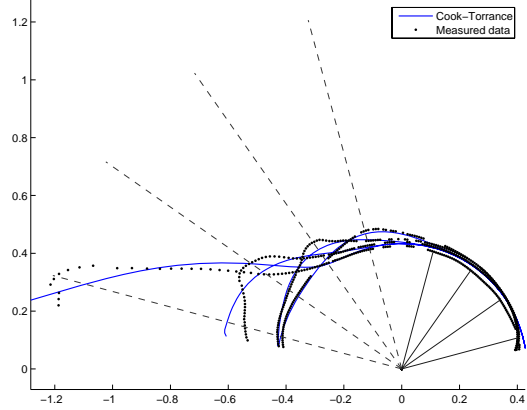
BRDF Plots in the incidence plane (Cubic root applied)



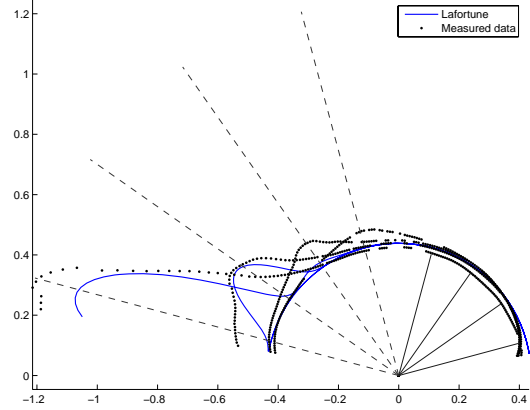
Ward



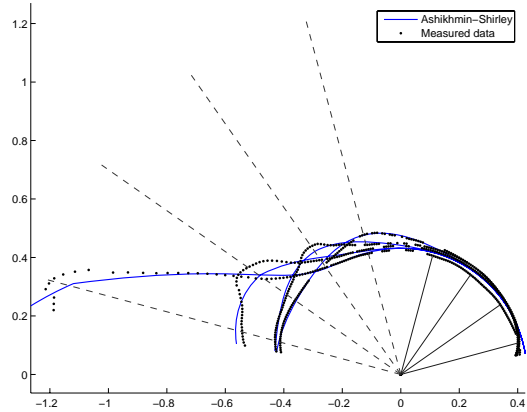
Ward-Duer



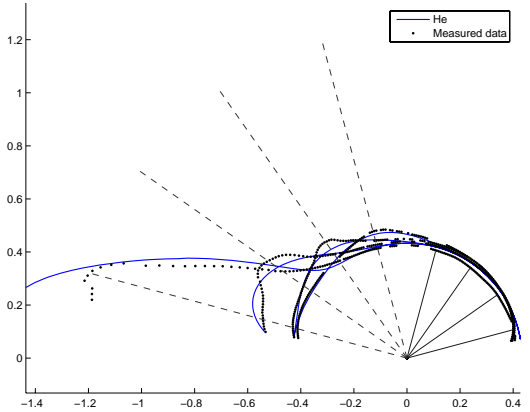
Cook-Torrance



Lafortune



Ashikhmin-Shirley



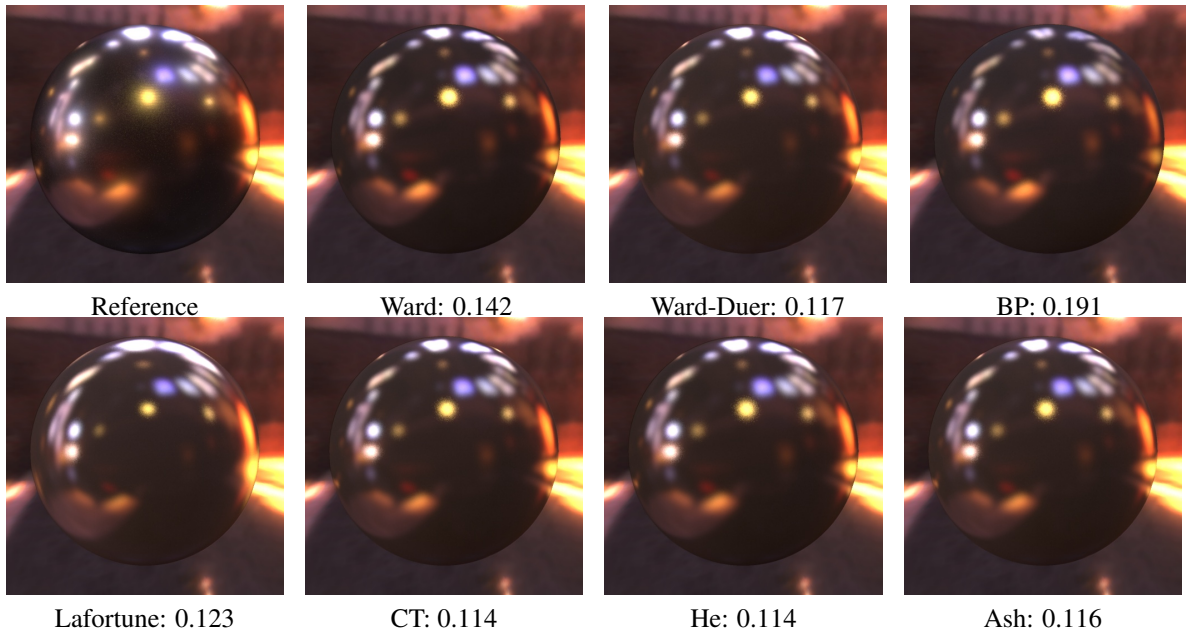
He

Material Name: nickel

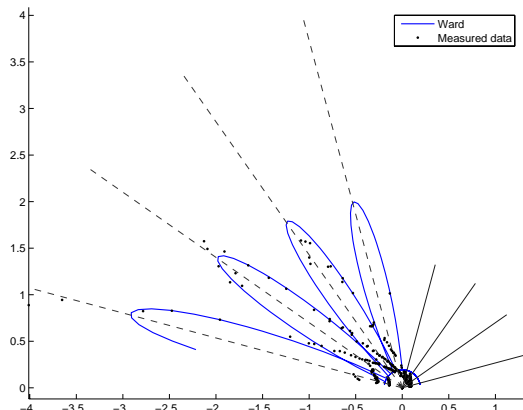
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.0221	0.0178	0.0107	0.204	0.154	0.0946	0.0432			0.142
Ward-Duer	0.0388	0.0291	0.0159	0.107	0.0828	0.054	0.0424			0.117
Blinn-Phong	0.0301	0.0257	0.0173	0.0665	0.0486	0.0285	1.04e+003			0.191
Lafortune et al.	0.0419	0.0314	0.0183	0.912	0.71	0.456	-0.579	0.574	377	0.123
Cook-Torrance	0.0342	0.0256	0.014	0.16	0.124	0.0798	0.733	0.0424		0.114
He et al.	0.028	0.0208	0.0108	0.208	0.161	0.104	28	0.647	9.1	0.114
Ashikhmin-Shirley	0.036	0.0271	0.0146	0.117	0.0902	0.0587	0.999	1.03e+003		0.116

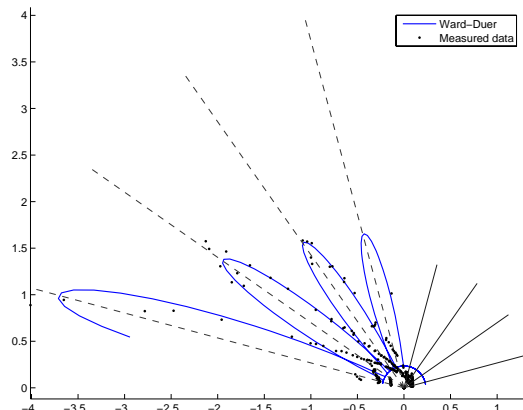
Rendered Images



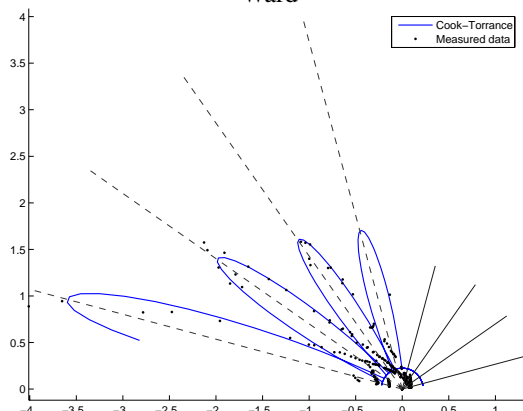
BRDF Plots in the incidence plane (Cubic root applied)



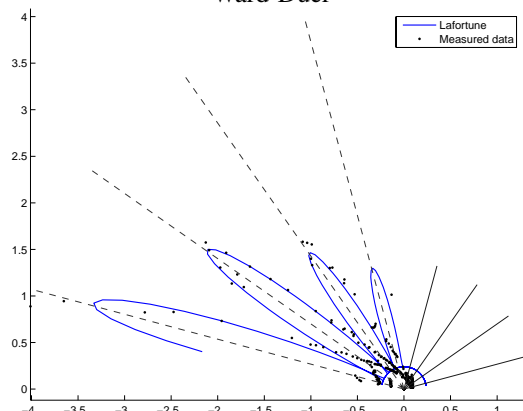
Ward



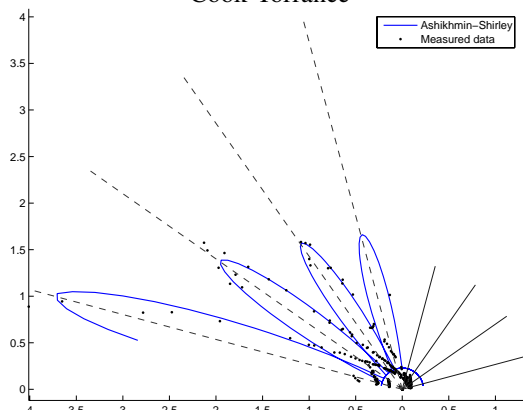
Ward-Duer



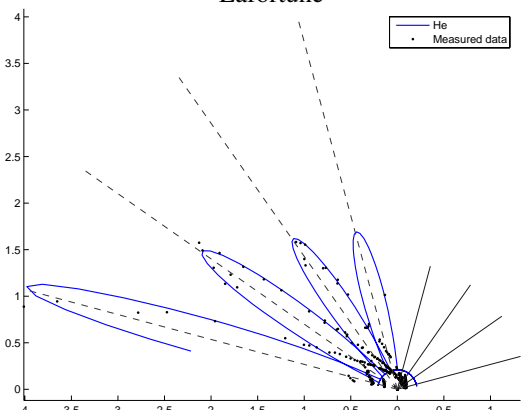
Cook-Torrance



Lafortune



Ashikhmin-Shirley



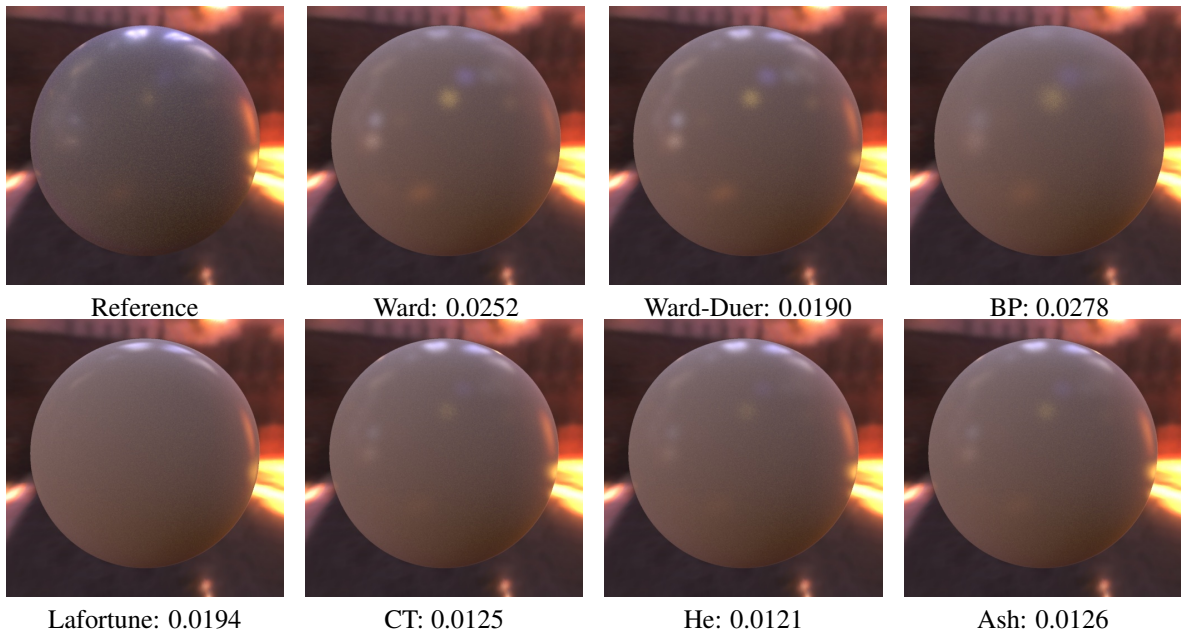
He

Material Name: nylon

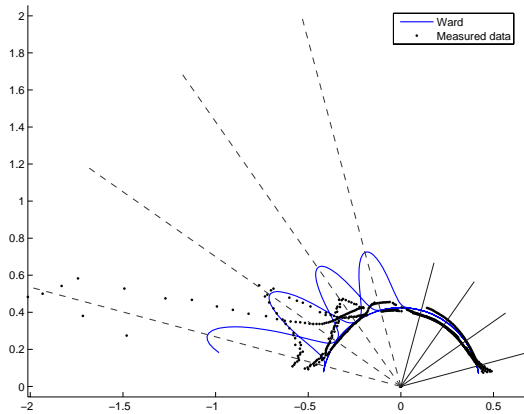
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.235	0.203	0.127	0.0193	0.0157	0.00988	0.068			0.0252
Ward-Duer	0.234	0.202	0.127	0.0143	0.0118	0.00727	0.0645			0.019
Blinn-Phong	0.236	0.204	0.127	0.00572	0.00479	0.0031	215			0.0278
Lafortune et al.	0.243	0.21	0.131	0.188	0.158	0.0957	-0.582	0.567	499	0.0194
Cook-Torrance	0.239	0.206	0.129	0.101	0.0859	0.0521	0.0423	0.0662		0.0125
He et al.	0.239	0.206	0.129	0.126	0.107	0.065	24	0.842	1.45	0.0121
Ashikhmin-Shirley	0.238	0.206	0.129	0.112	0.0965	0.0584	0.0539	414		0.0126

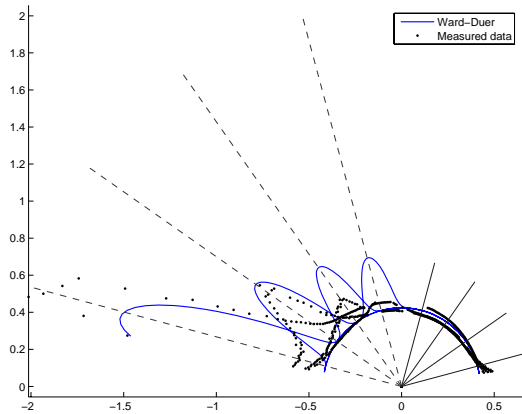
Rendered Images



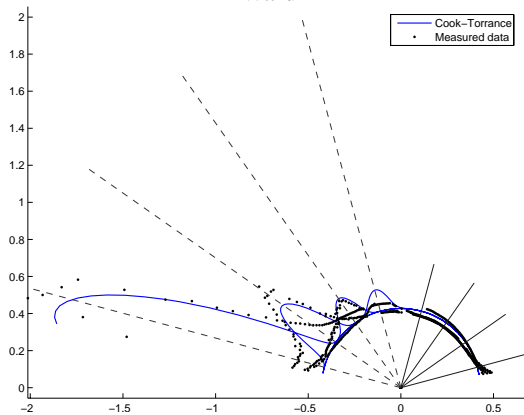
BRDF Plots in the incidence plane (Cubic root applied)



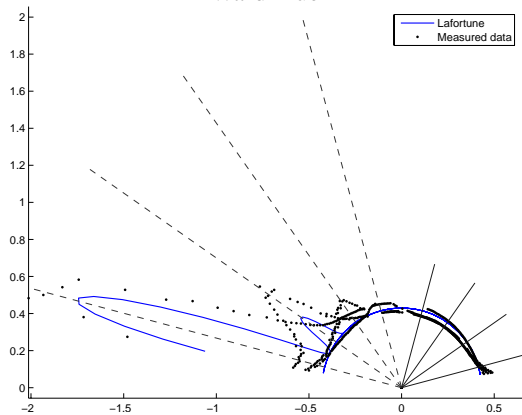
Ward



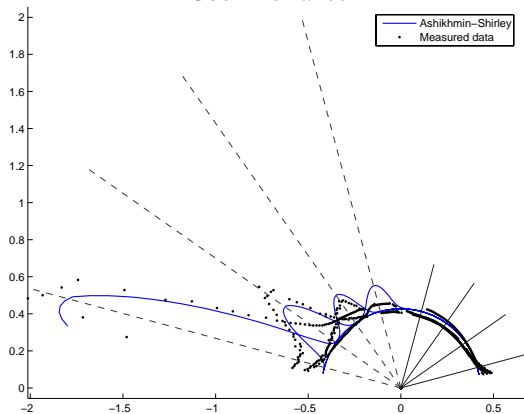
Ward-Duer



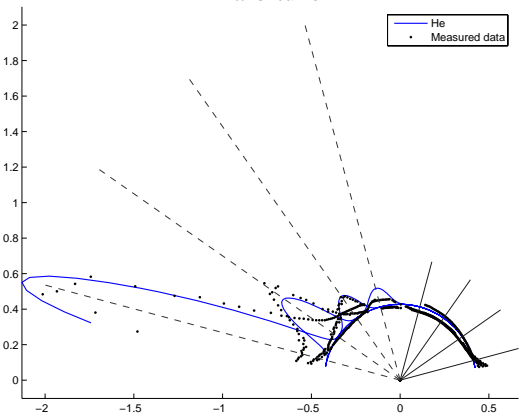
Cook-Torrance



Lafortune



Ashikhmin-Shirley



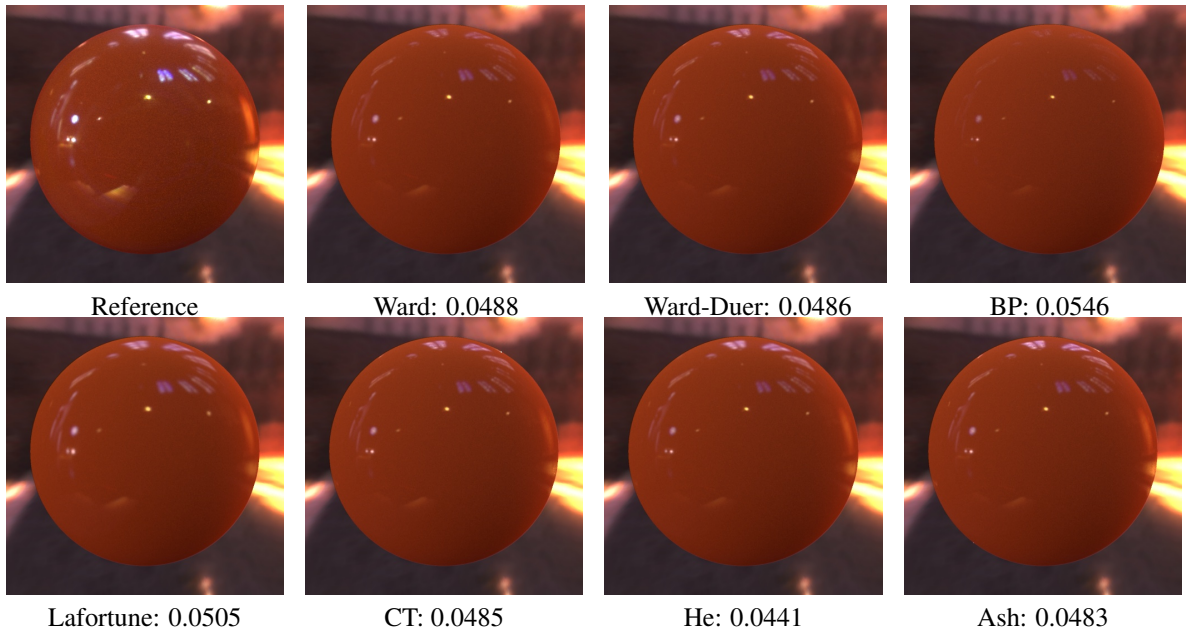
He

Material Name: orange-bball

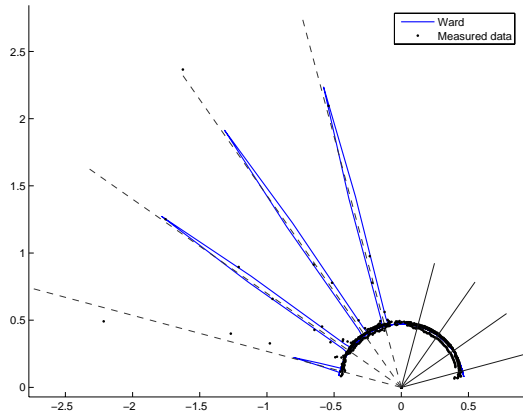
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.322	0.0456	0.00393	0.00839	0.00473	0.00311	0.00734			0.0488
Ward-Duer	0.323	0.0458	0.00402	0.00583	0.00329	0.00221	0.00679			0.0486
Blinn-Phong	0.325	0.0469	0.00486	0.00125	0.00069	0.000432	1.07e+005			0.0546
Lafortune et al.	0.321	0.0444	0.00313	0.0273	0.0174	0.012	-0.577	0.577	3.96e+003	0.0505
Cook-Torrance	0.323	0.0457	0.00395	0.0206	0.0117	0.00793	0.284	0.00701		0.0485
He et al.	0.322	0.0451	0.00362	7.69	4.81	3.24	30	0.0286	1.17	0.0441
Ashikhmin-Shirley	0.323	0.0457	0.00397	0.0398	0.0229	0.0155	0.14	4.26e+004		0.0483

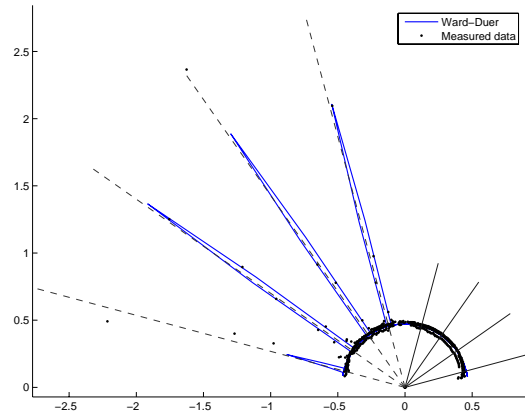
Rendered Images



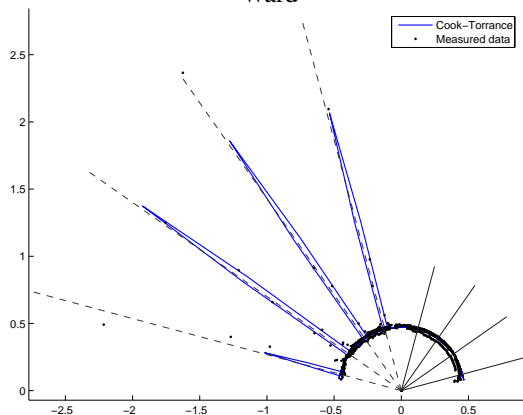
BRDF Plots in the incidence plane (Cubic root applied)



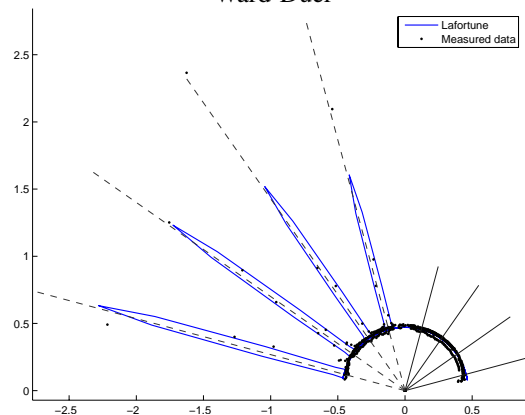
Ward



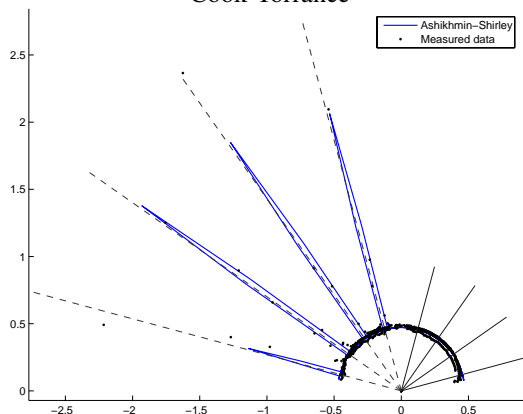
Ward-Duer



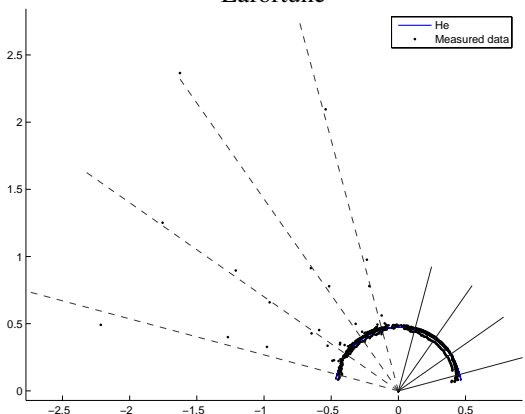
Cook-Torrance



Lafortune



Ashikhmin-Shirley



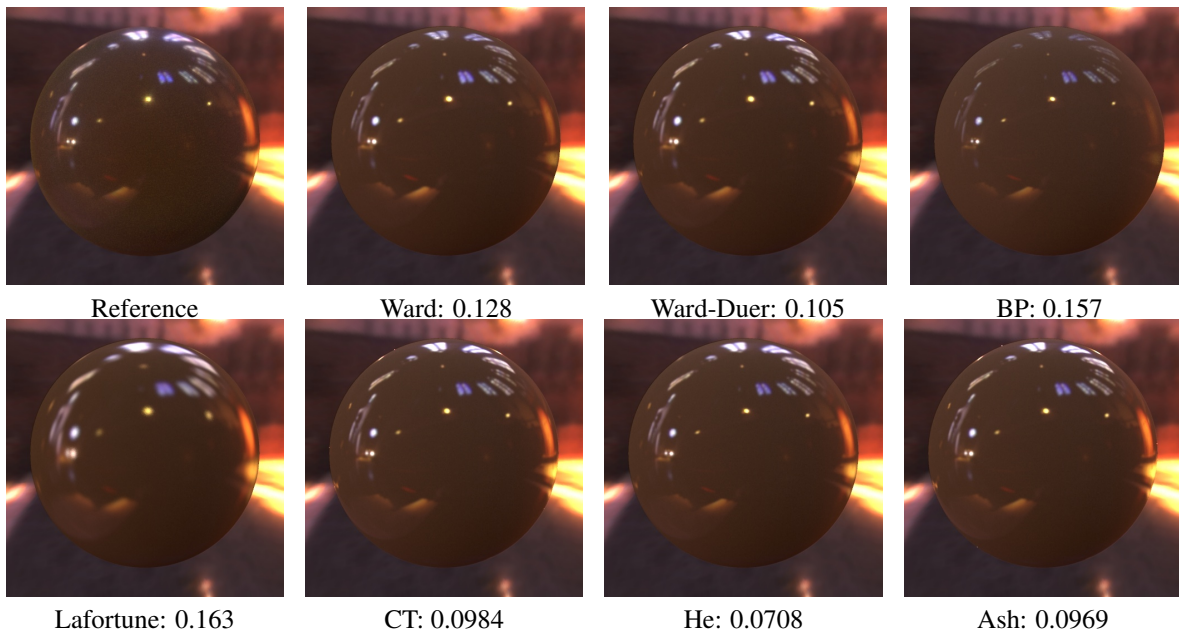
He

Material Name: orange-calcite

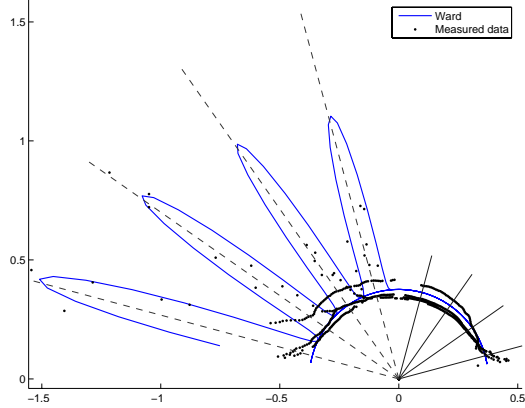
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.0857	0.045	0.0135	0.0346	0.0288	0.0176	0.0101			0.128
Ward-Duer	0.0835	0.0435	0.0128	0.027	0.0221	0.0132	0.011			0.105
Blinn-Phong	0.096	0.0534	0.0184	0.0057	0.00486	0.00313	5.11e+004			0.157
Lafortune et al.	0.0747	0.0379	0.00957	0.217	0.166	0.0989	-0.578	0.576	1.16e+003	0.163
Cook-Torrance	0.0861	0.0457	0.0142	0.156	0.126	0.0754	0.134	0.01		0.0984
He et al.	0.0858	0.0458	0.0141	3.46	2.76	1.68	28.2	0.0798	1.21	0.0708
Ashikhmin-Shirley	0.0863	0.0459	0.0143	0.193	0.156	0.0933	0.112	2.1e+004		0.0969

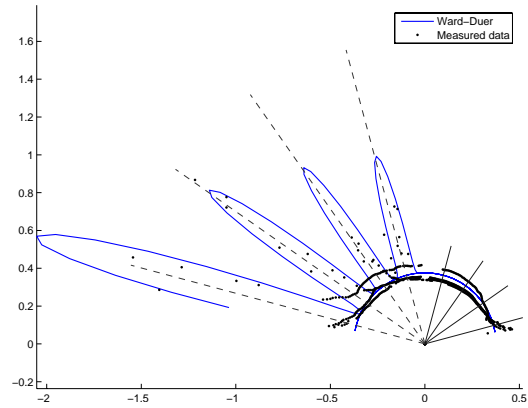
Rendered Images



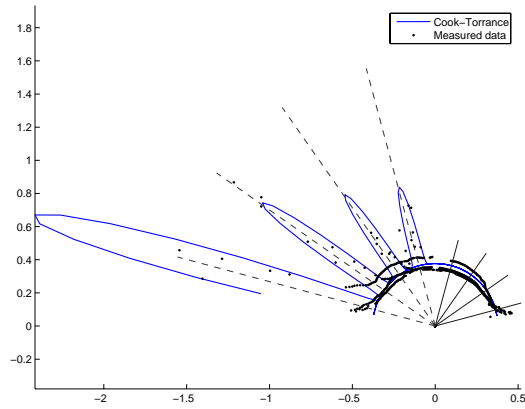
BRDF Plots in the incidence plane (Cubic root applied)



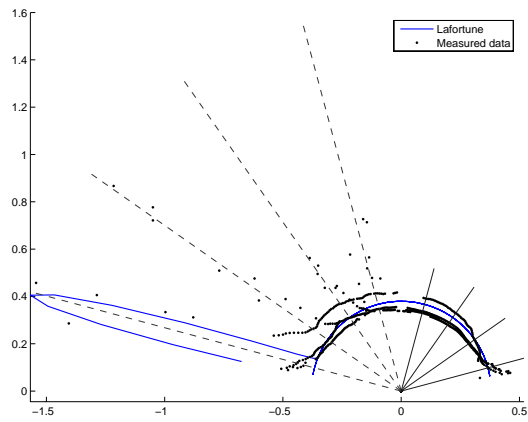
Ward



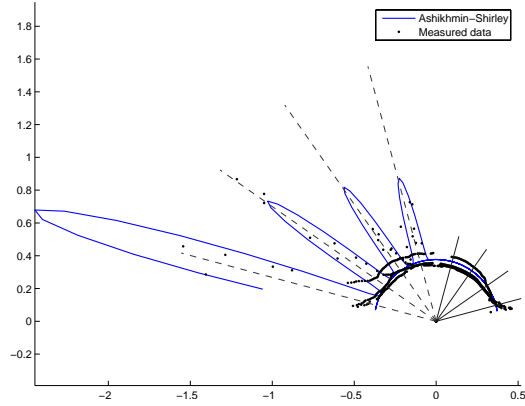
Ward-Duer



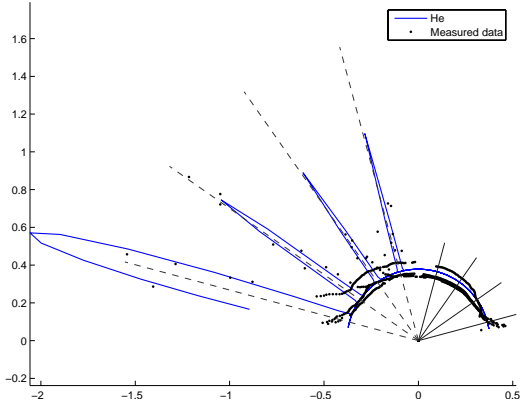
Cook-Torrance



Lafortune



Ashikhmin-Shirley



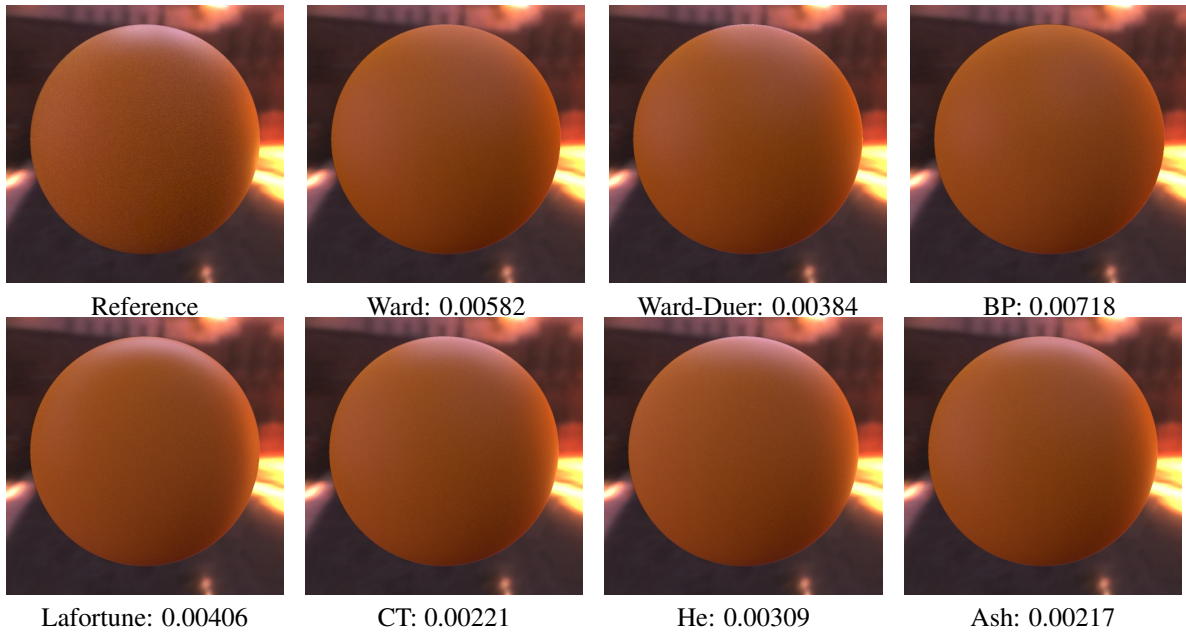
He

Material Name: orange-paint

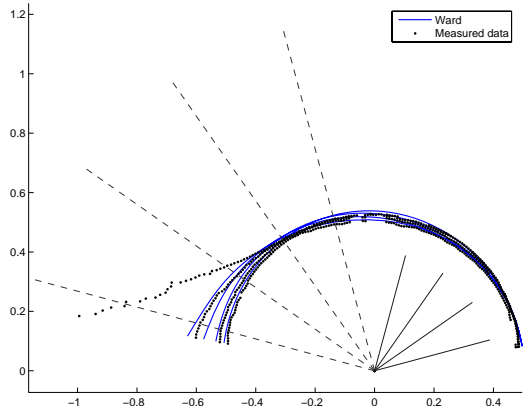
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.392	0.113	0	0.0756	0.0416	0.029	0.447			0.00582
Ward-Duer	0.401	0.115	0.00113	0.0335	0.0226	0.0151	0.354			0.00384
Blinn-Phong	0.41	0.124	0.00683	0.00928	0.00433	0.00317	24.2			0.00718
Lafortune et al.	0.419	0.126	0.00903	0.191	0.152	0.0951	-0.652	0.387	16.6	0.00406
Cook-Torrance	0.408	0.118	0.00367	0.182	0.133	0.0868	0.0874	0.355		0.00221
He et al.	0.405	0.116	0.00234	1.31	0.989	0.645	12.2	3.35	1.28	0.00309
Ashikhmin-Shirley	0.402	0.115	0.00122	0.301	0.213	0.14	0.117	10		0.00217

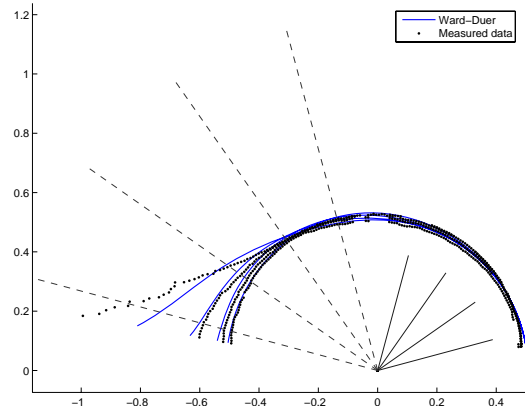
Rendered Images



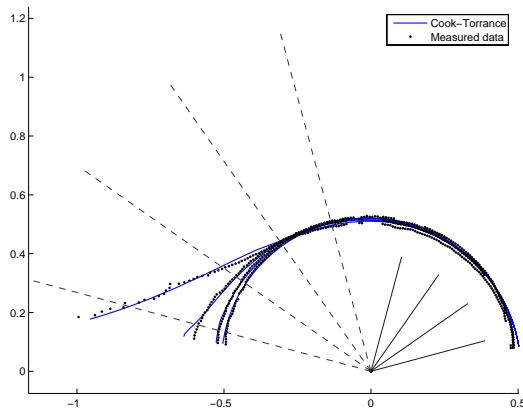
BRDF Plots in the incidence plane (Cubic root applied)



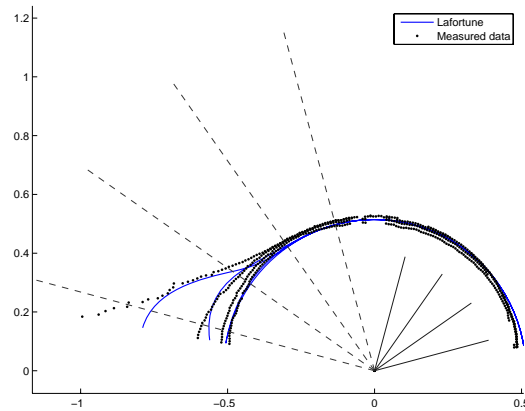
Ward



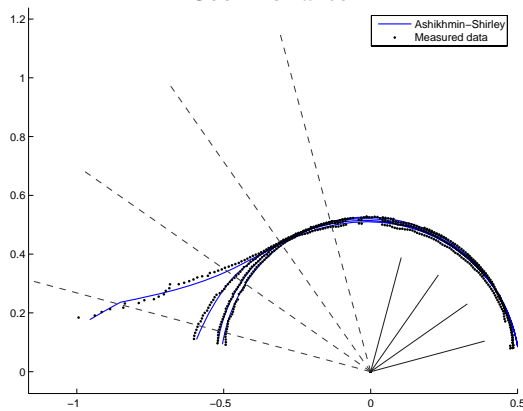
Ward-Duer



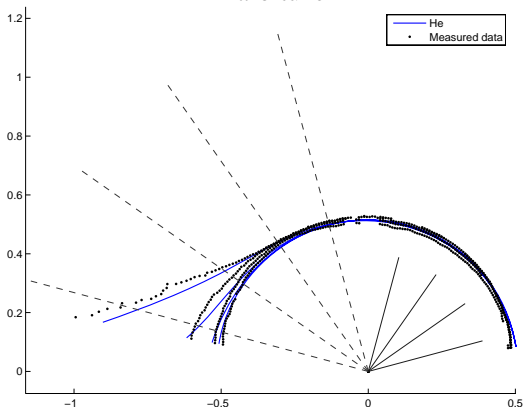
Cook-Torrance



Lafortune



Ashikhmin-Shirley



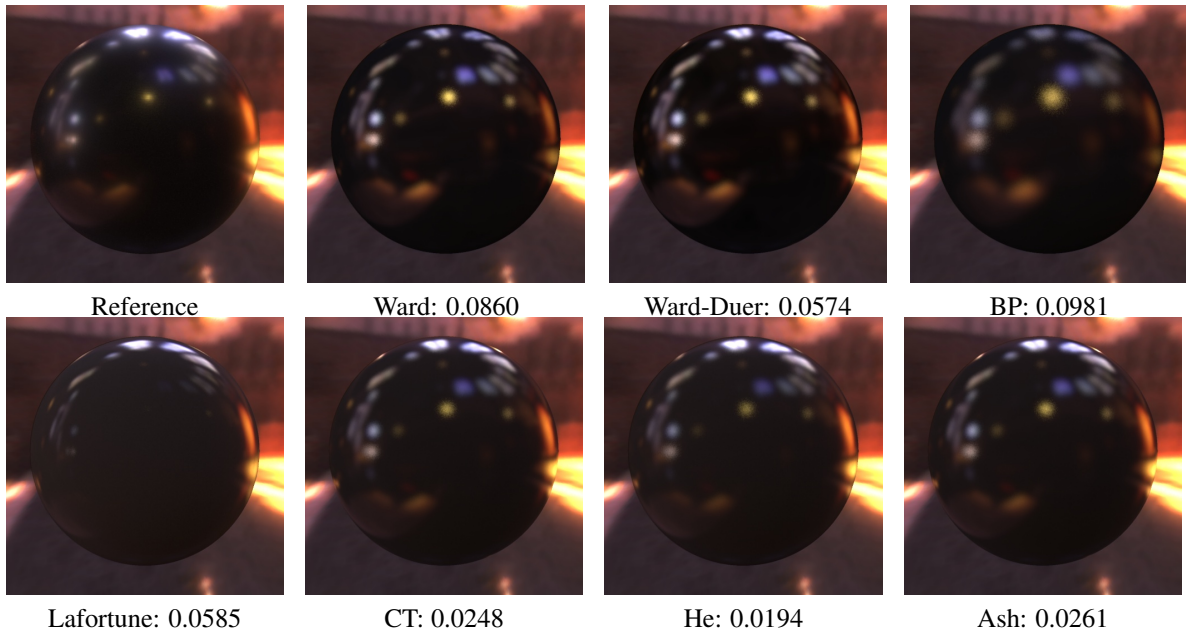
He

Material Name: paint-black

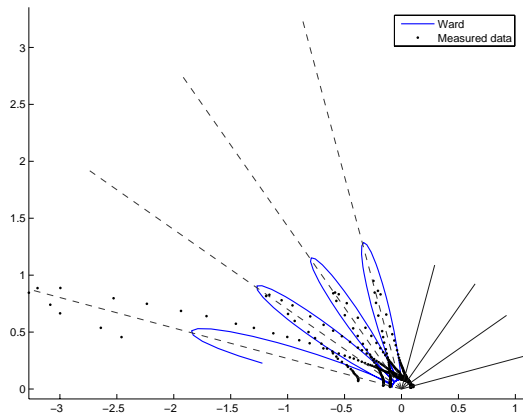
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.00181	0.00186	0.00178	0.0387	0.0318	0.0209	0.0367			0.086
Ward-Duer	0	0	0	0.0317	0.0264	0.0176	0.0376			0.0574
Blinn-Phong	0.00198	0.0022	0.00203	0.0127	0.0104	0.00679	528			0.0981
Lafortune et al.	0.0178	0.0149	0.0103	0.392	0.326	0.217	-0.579	0.574	1.29e+003	0.0585
Cook-Torrance	0.00859	0.00708	0.00502	0.2	0.168	0.113	0.0569	0.0392		0.0248
He et al.	0.0103	0.0085	0.00594	0.416	0.351	0.236	20.5	0.434	1.3	0.0194
Ashikhmin-Shirley	0.00739	0.00609	0.00436	0.216	0.182	0.122	0.0697	1.2e+003		0.0261

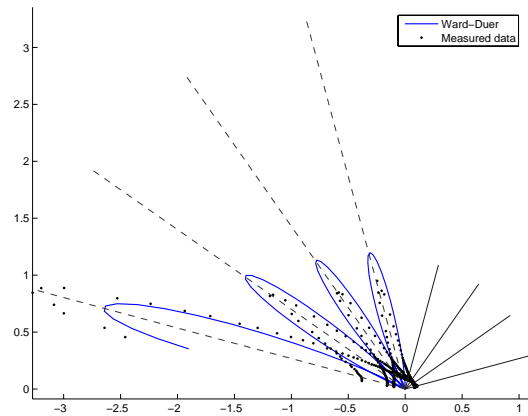
Rendered Images



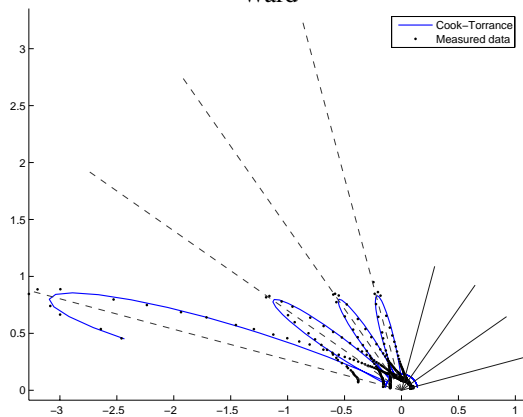
BRDF Plots in the incidence plane (Cubic root applied)



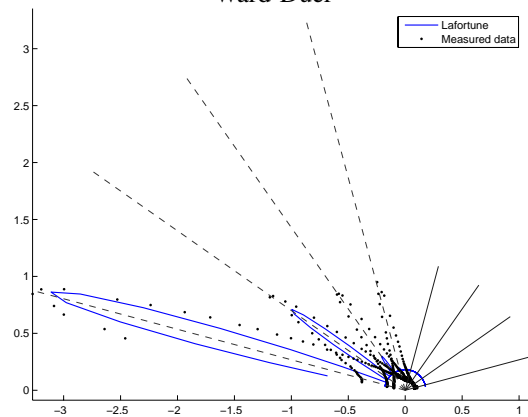
Ward



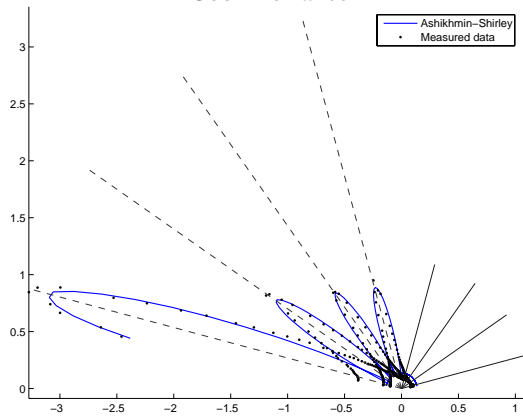
Ward-Duer



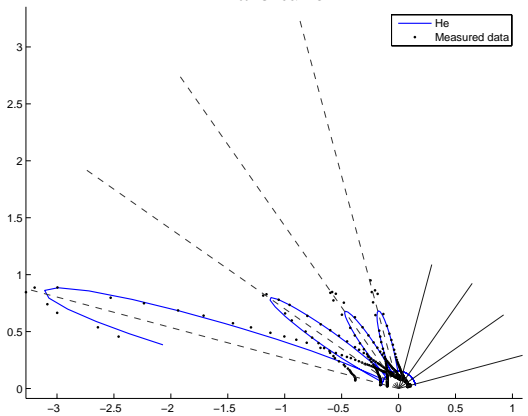
Cook-Torrance



Lafortune



Ashikhmin-Shirley



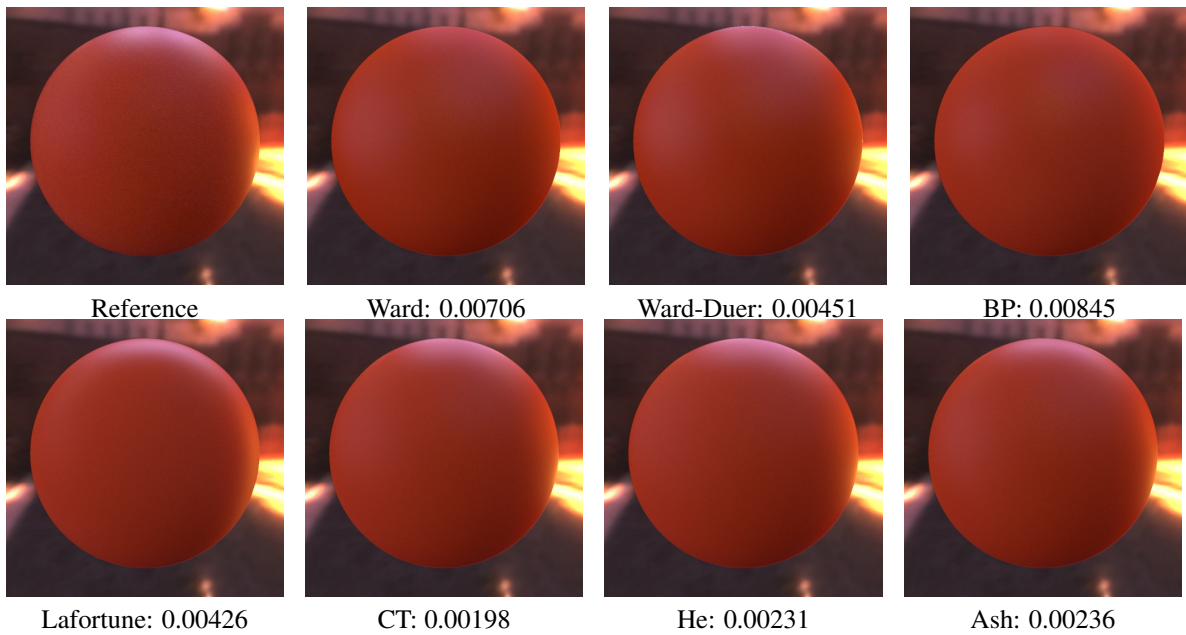
He

Material Name: paint-light-red

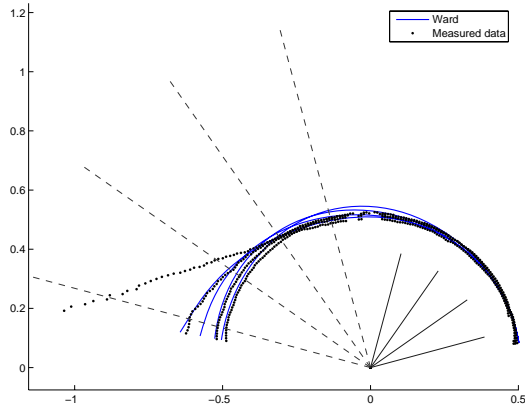
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.405	0.032	0.00155	0.0523	0.0356	0.0269	0.354			0.00706
Ward-Duer	0.406	0.0318	0.002	0.0314	0.0231	0.0167	0.317			0.00451
Blinn-Phong	0.418	0.0415	0.00847	0.00735	0.00462	0.00362	30.7			0.00845
Lafortune et al.	0.424	0.0442	0.0111	0.235	0.184	0.128	-0.652	0.386	18.6	0.00426
Cook-Torrance	0.414	0.037	0.00602	0.192	0.147	0.103	0.0689	0.316		0.00198
He et al.	0.413	0.0361	0.00532	0.721	0.557	0.391	20	3.99	1.34	0.00231
Ashikhmin-Shirley	0.41	0.0344	0.00414	0.297	0.224	0.157	0.0902	14		0.00236

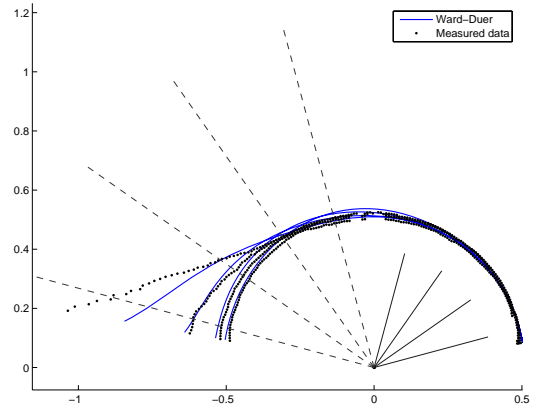
Rendered Images



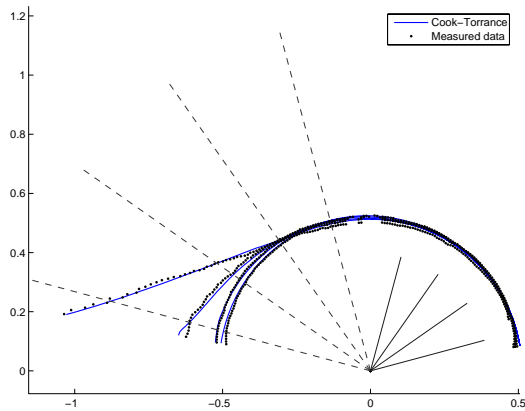
BRDF Plots in the incidence plane (Cubic root applied)



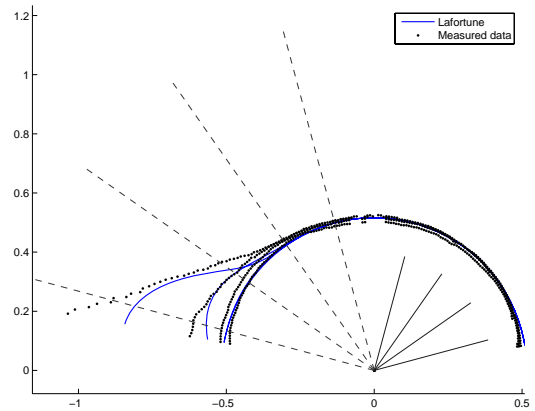
Ward



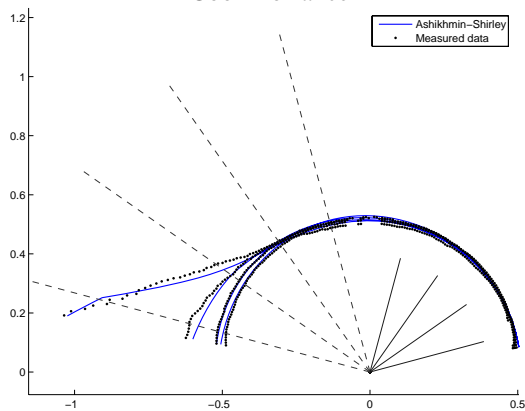
Ward-Duer



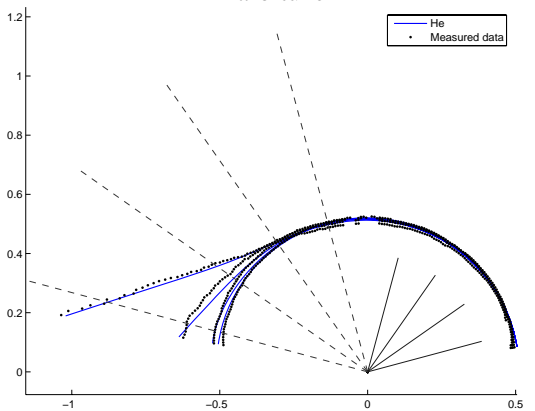
Cook-Torrance



Lafortune



Ashikhmin-Shirley



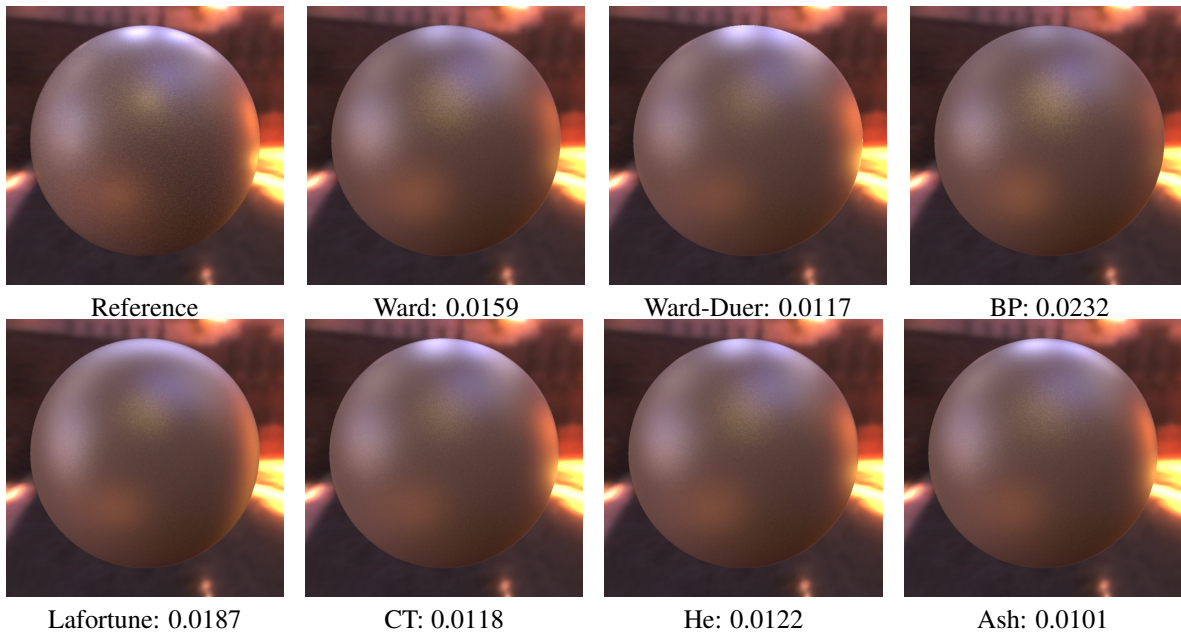
He

Material Name: paint-silver

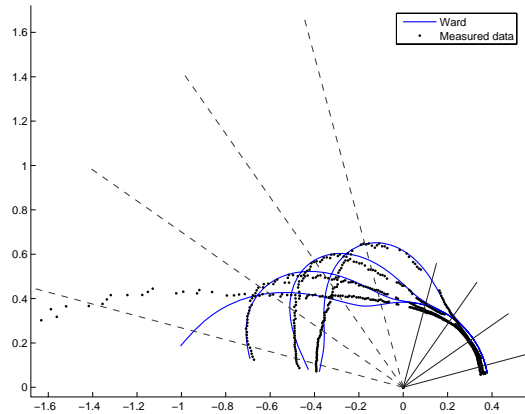
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.172	0.122	0.0725	0.158	0.139	0.0985	0.233			0.0159
Ward-Duer	0.192	0.139	0.0847	0.0821	0.072	0.0509	0.216			0.0117
Blinn-Phong	0.181	0.129	0.0776	0.0443	0.0389	0.0276	39.9			0.0232
Lafortune et al.	0.184	0.132	0.0795	0.251	0.221	0.156	-0.594	0.542	13.7	0.0187
Cook-Torrance	0.191	0.138	0.084	0.084	0.0737	0.0522	0.924	0.207		0.0118
He et al.	0.182	0.13	0.0783	0.159	0.14	0.0988	20	2.11	9.08	0.0122
Ashikhmin-Shirley	0.182	0.13	0.0783	0.115	0.101	0.0715	0.918	35		0.0101

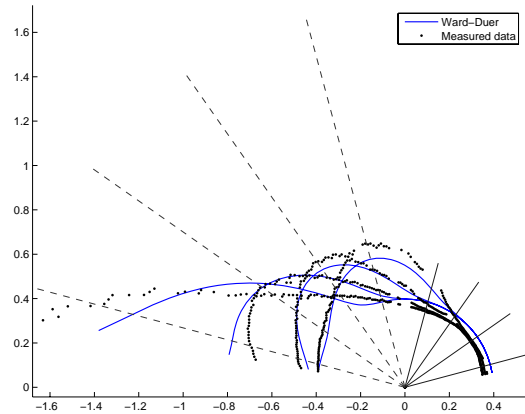
Rendered Images



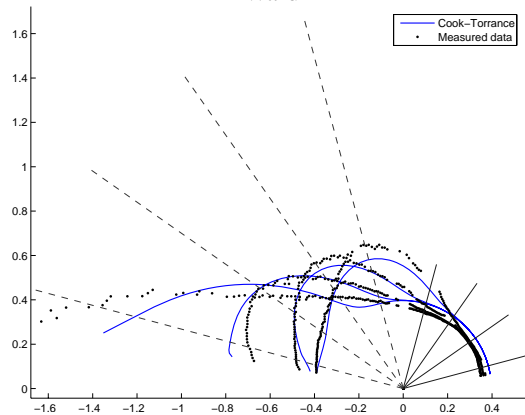
BRDF Plots in the incidence plane (Cubic root applied)



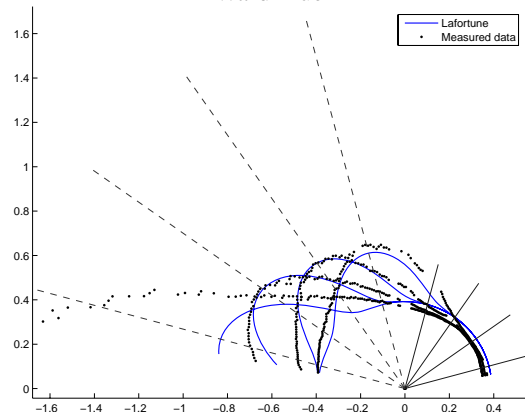
Ward



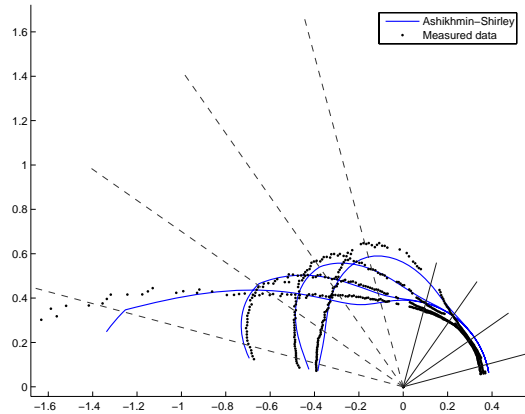
Ward-Duer



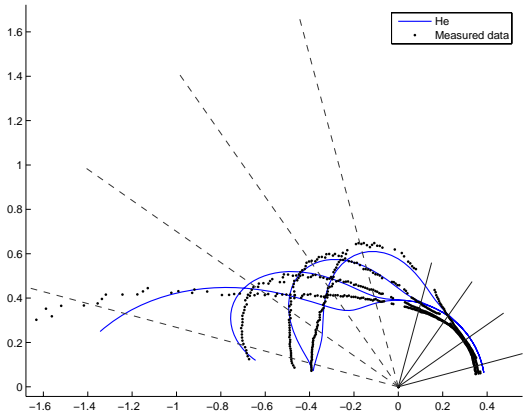
Cook-Torrance



Lafortune



Ashikhmin-Shirley



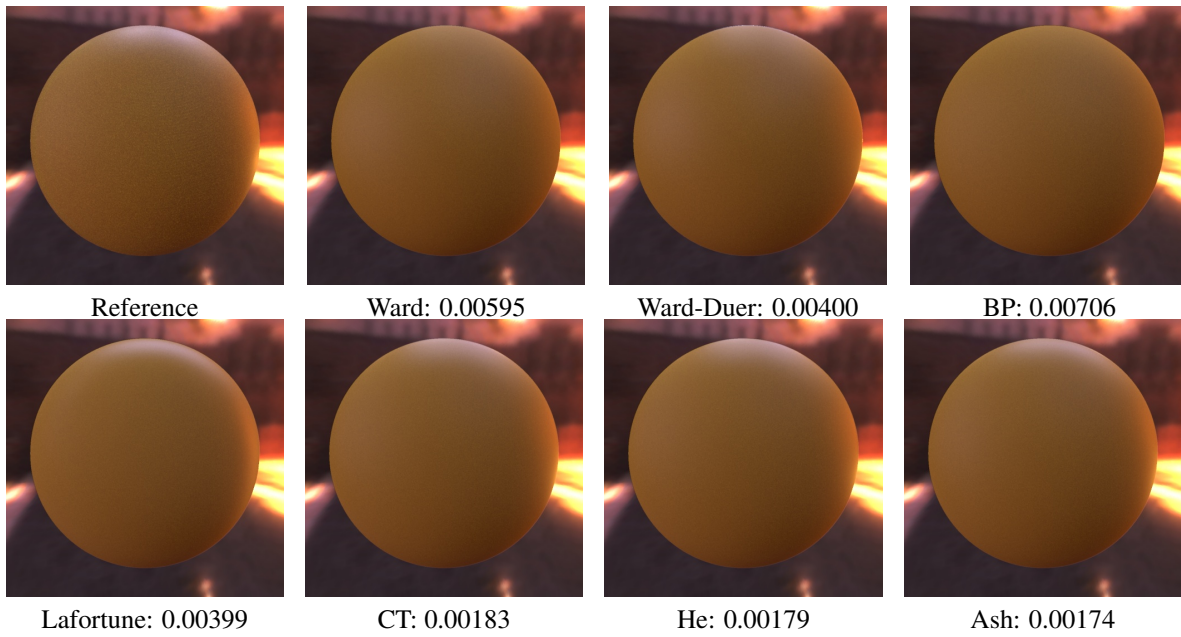
He

Material Name: paint-yellow

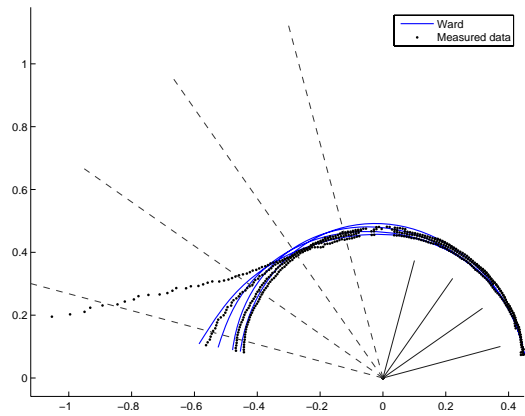
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.29	0.161	0.0128	0.0473	0.0397	0.0233	0.381			0.00595
Ward-Duer	0.293	0.164	0.0139	0.0255	0.0213	0.0131	0.317			0.004
Blinn-Phong	0.29	0.161	0.0139	0.014	0.0115	0.00616	9.02			0.00706
Lafortune et al.	0.308	0.177	0.0217	0.181	0.15	0.0956	-0.637	0.434	27.4	0.00399
Cook-Torrance	0.3	0.17	0.0173	0.162	0.133	0.0841	0.0626	0.31		0.00183
He et al.	0.299	0.169	0.017	0.385	0.317	0.201	24	4	1.41	0.00179
Ashikhmin-Shirley	0.297	0.167	0.0159	0.247	0.202	0.127	0.0831	15		0.00174

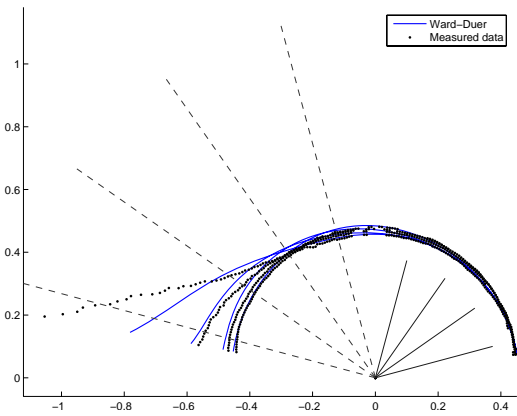
Rendered Images



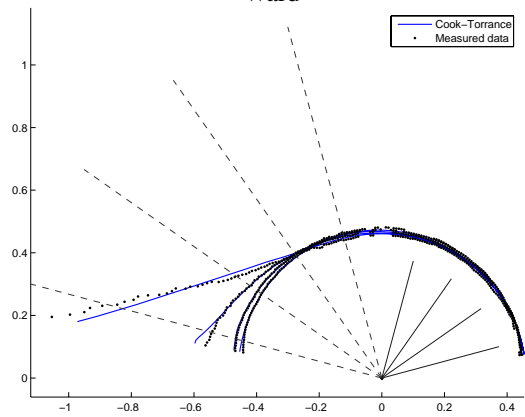
BRDF Plots in the incidence plane (Cubic root applied)



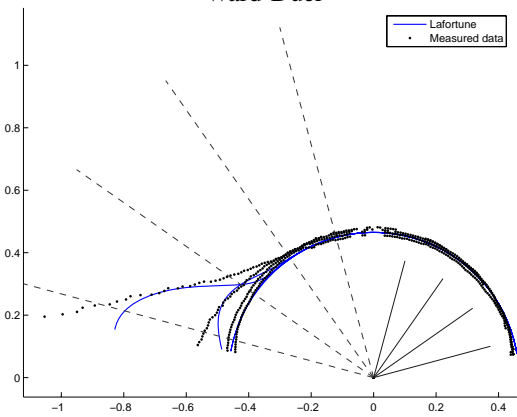
Ward



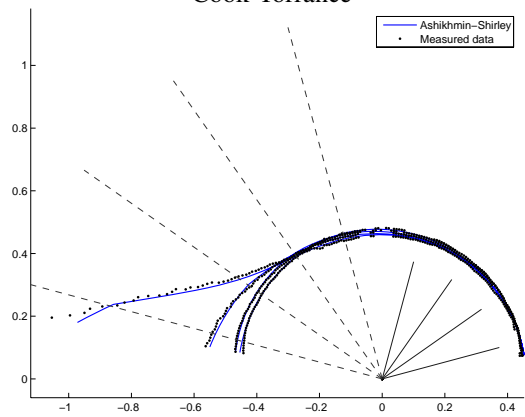
Ward-Duer



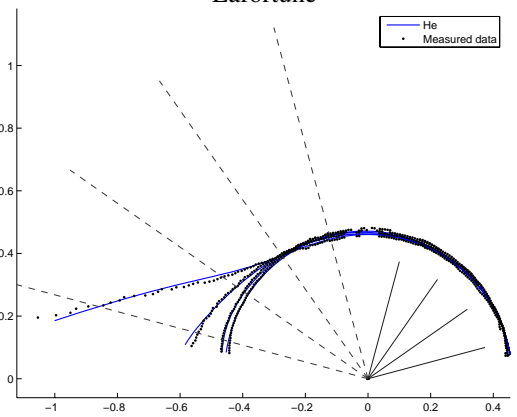
Cook-Torrance



Lafortune



Ashikhmin-Shirley



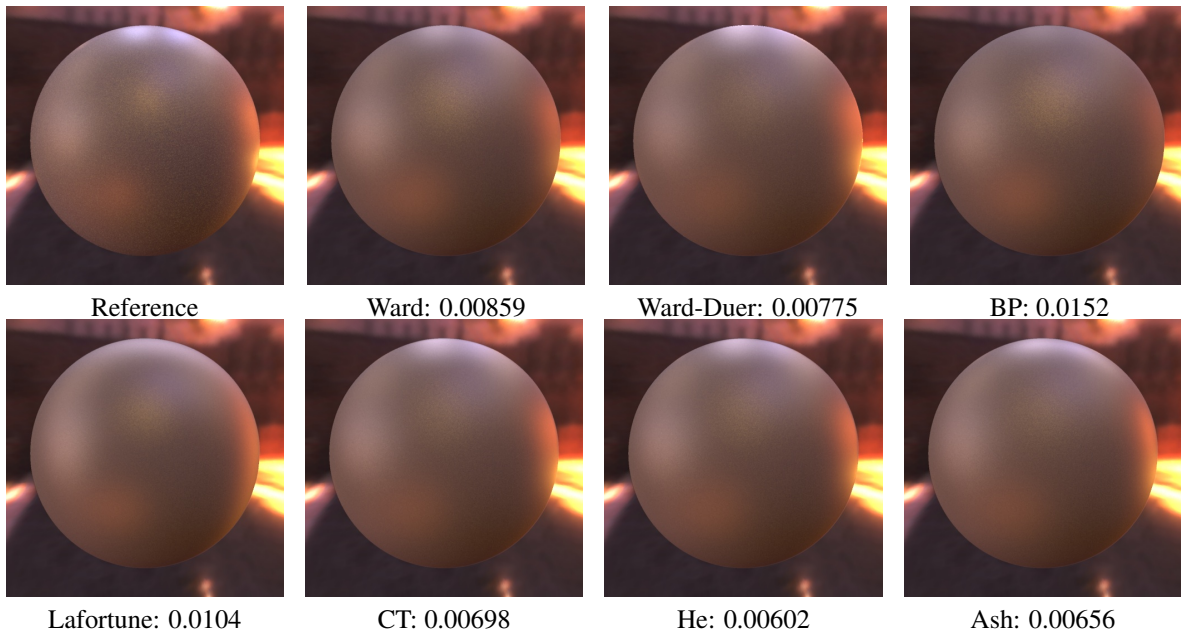
He

Material Name: pearl-paint

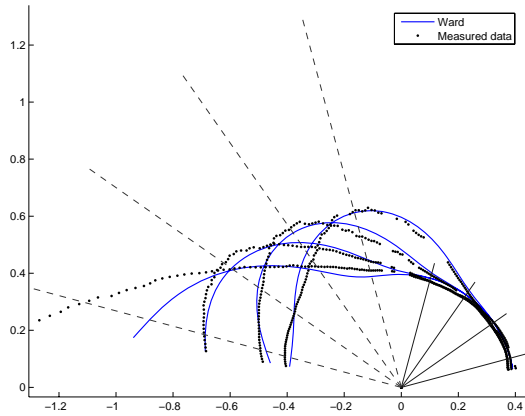
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.189	0.145	0.0842	0.159	0.116	0.0564	0.262			0.00859
Ward-Duer	0.208	0.158	0.089	0.0827	0.0613	0.0317	0.255			0.00775
Blinn-Phong	0.189	0.146	0.0861	0.0485	0.0346	0.0161	27.7			0.0152
Lafortune et al.	0.2	0.152	0.0879	0.242	0.176	0.0855	-0.598	0.534	10.9	0.0104
Cook-Torrance	0.205	0.155	0.088	0.129	0.0956	0.0489	0.621	0.24		0.00698
He et al.	0.199	0.151	0.0863	0.25	0.184	0.0934	20.8	2.53	4.37	0.00602
Ashikhmin-Shirley	0.198	0.15	0.0855	0.108	0.0796	0.0407	0.999	25.7		0.00656

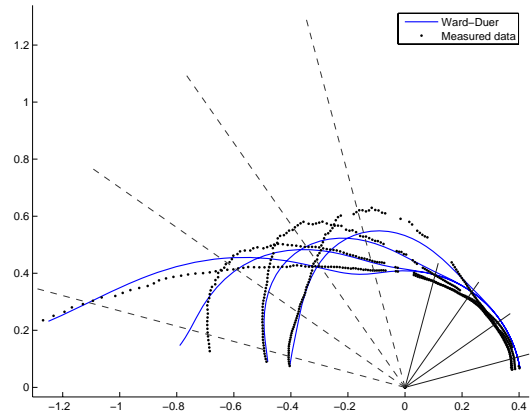
Rendered Images



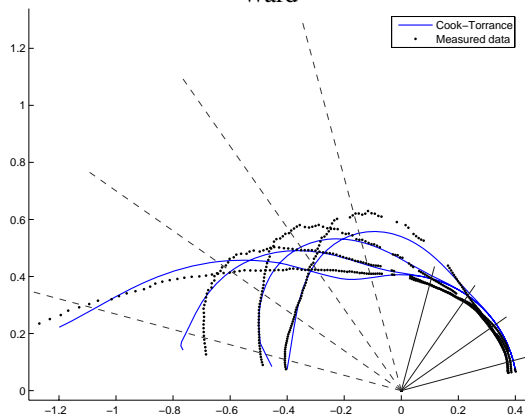
BRDF Plots in the incidence plane (Cubic root applied)



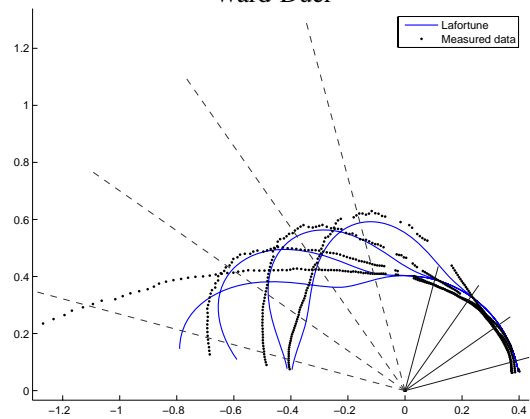
Ward



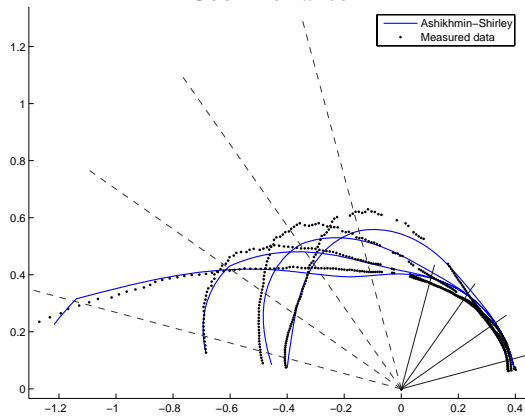
Ward-Duer



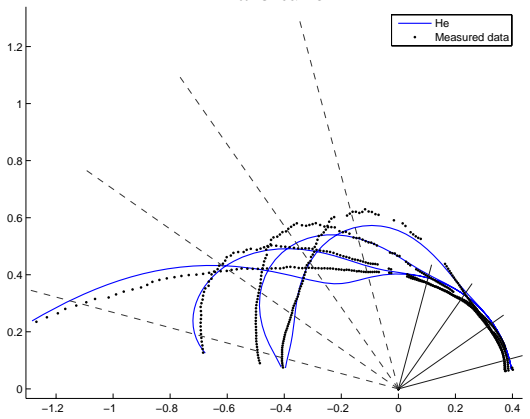
Cook-Torrance



Lafortune



Ashikhmin-Shirley



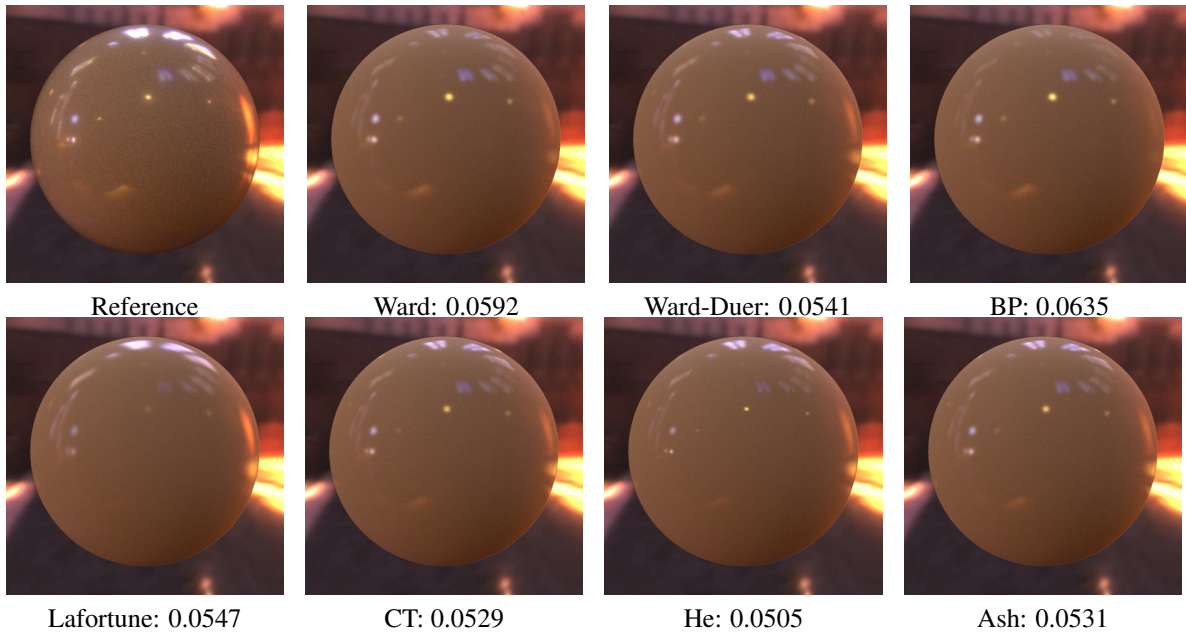
He

Material Name: phenolic-yellow

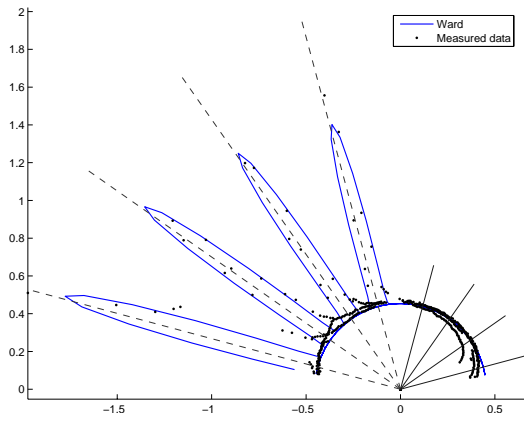
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.287	0.179	0.0589	0.0166	0.0131	0.00898	0.0214			0.0592
Ward-Duer	0.286	0.179	0.0586	0.0116	0.00873	0.00646	0.0227			0.0541
Blinn-Phong	0.288	0.18	0.0597	0.00477	0.00387	0.00252	4.39e+003			0.0635
Lafortune et al.	0.289	0.181	0.0599	0.201	0.145	0.113	-0.579	0.575	994	0.0547
Cook-Torrance	0.288	0.18	0.0594	0.047	0.0342	0.0263	0.153	0.0196		0.0529
He et al.	0.289	0.181	0.06	259	193	143	20	0.0122	1.06	0.0505
Ashikhmin-Shirley	0.288	0.18	0.0594	0.0424	0.0309	0.0237	0.188	5.21e+003		0.0531

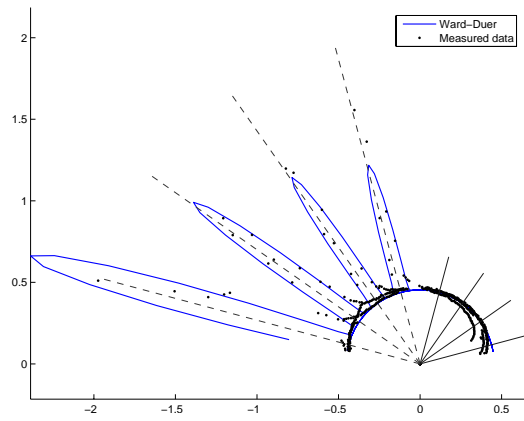
Rendered Images



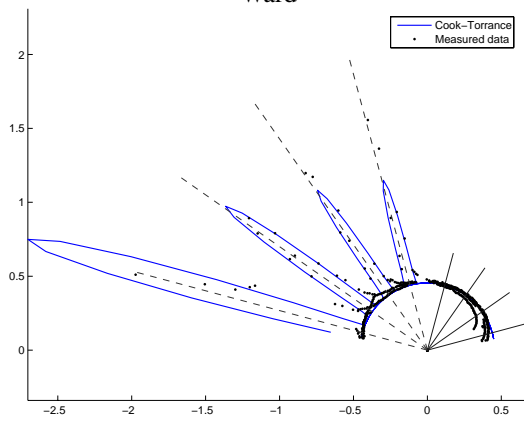
BRDF Plots in the incidence plane (Cubic root applied)



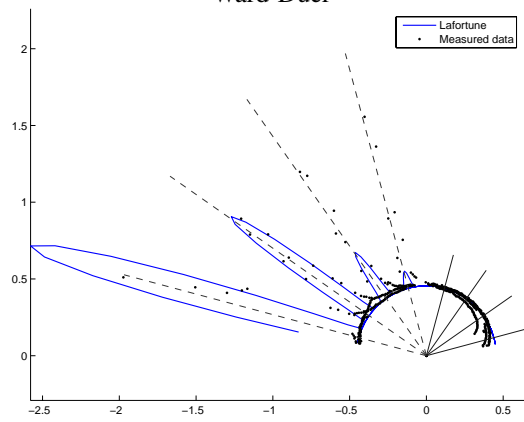
Ward



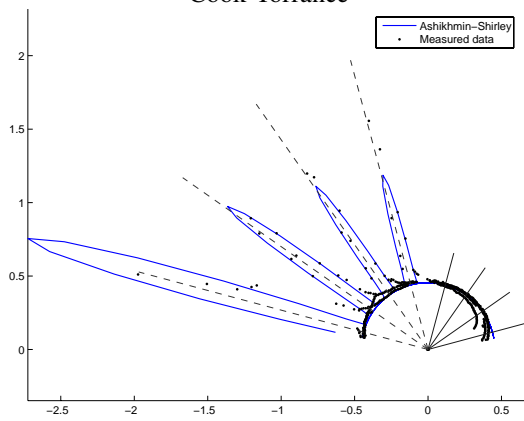
Ward-Duer



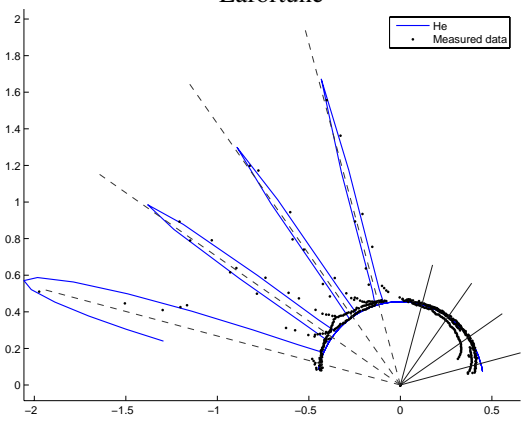
Cook-Torrance



Lafortune



Ashikhmin-Shirley



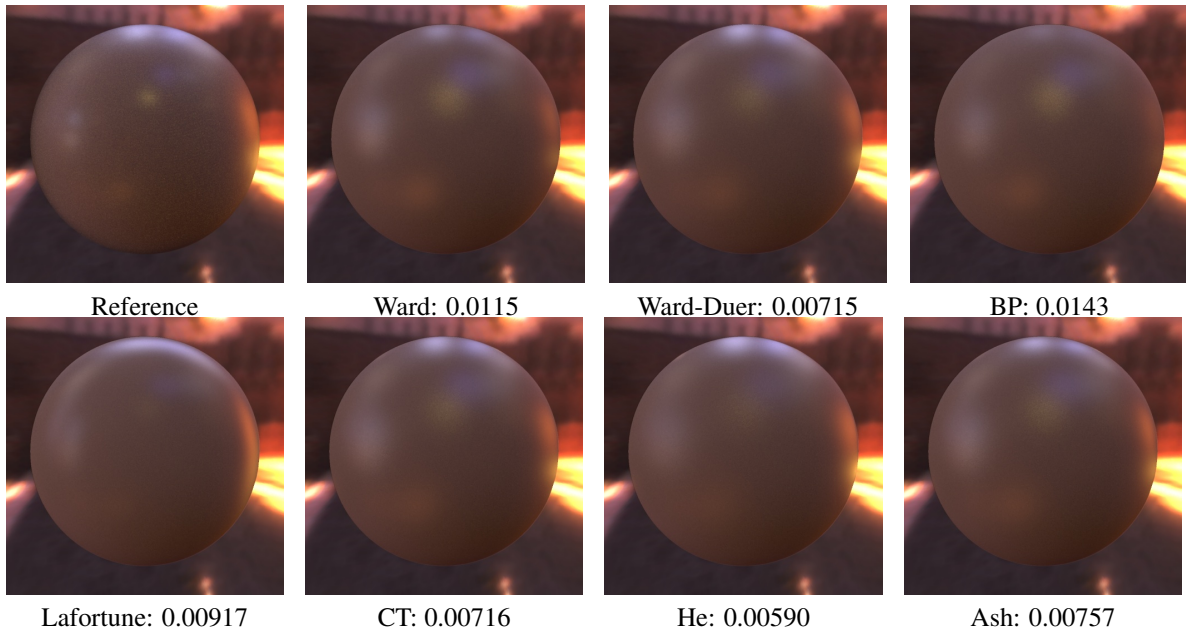
He

Material Name: pickled-oak-260

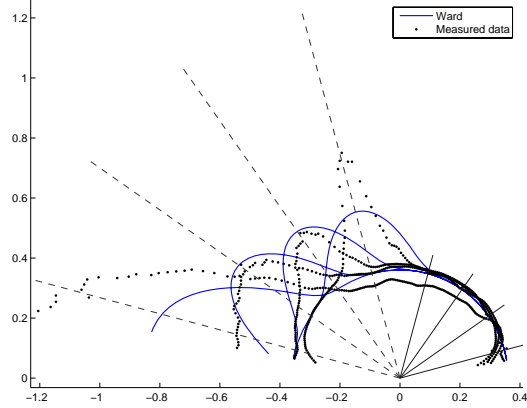
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.143	0.094	0.054	0.0359	0.0313	0.0215	0.146			0.0115
Ward-Duer	0.141	0.0925	0.053	0.0267	0.0233	0.016	0.163			0.00715
Blinn-Phong	0.146	0.0968	0.0559	0.00986	0.00855	0.00584	86.8			0.0143
Lafortune et al.	0.151	0.101	0.0591	0.151	0.132	0.0906	-0.595	0.541	46.8	0.00917
Cook-Torrance	0.141	0.0926	0.053	0.0253	0.0221	0.0151	0.999	0.158		0.00716
He et al.	0.144	0.0949	0.0546	0.194	0.169	0.116	16.1	1.46	1.94	0.0059
Ashikhmin-Shirley	0.139	0.0913	0.0522	0.034	0.0297	0.0203	0.909	67.6		0.00757

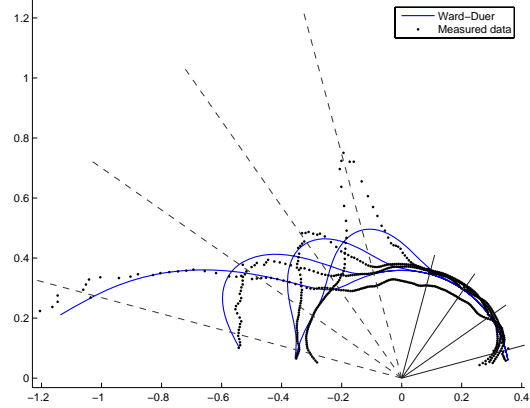
Rendered Images



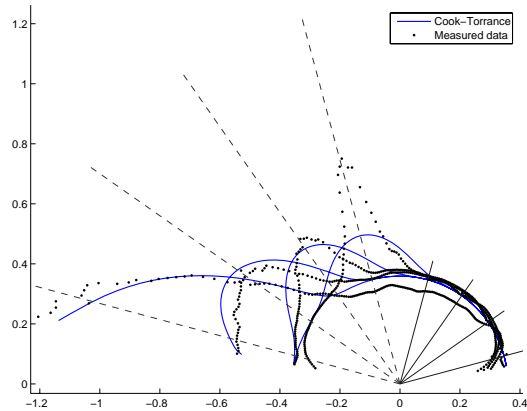
BRDF Plots in the incidence plane (Cubic root applied)



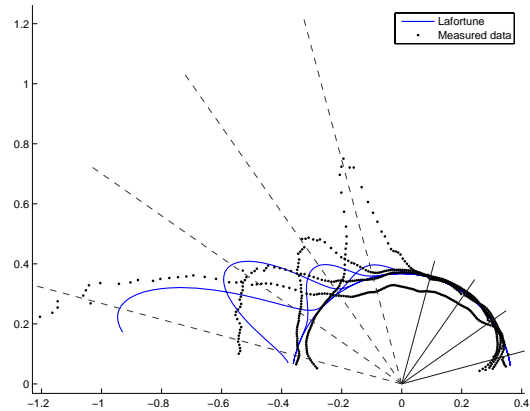
Ward



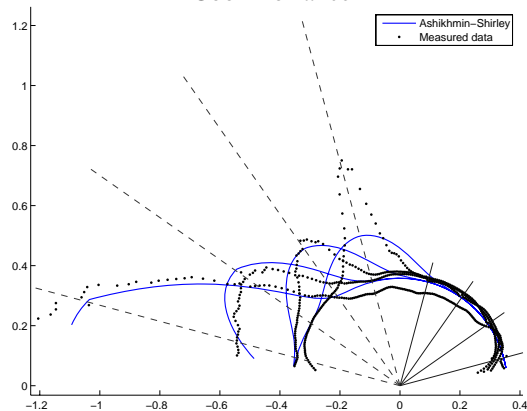
Ward-Duer



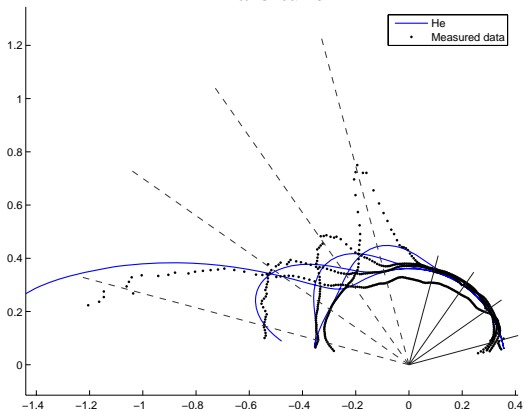
Cook-Torrance



Lafortune



Ashikhmin-Shirley



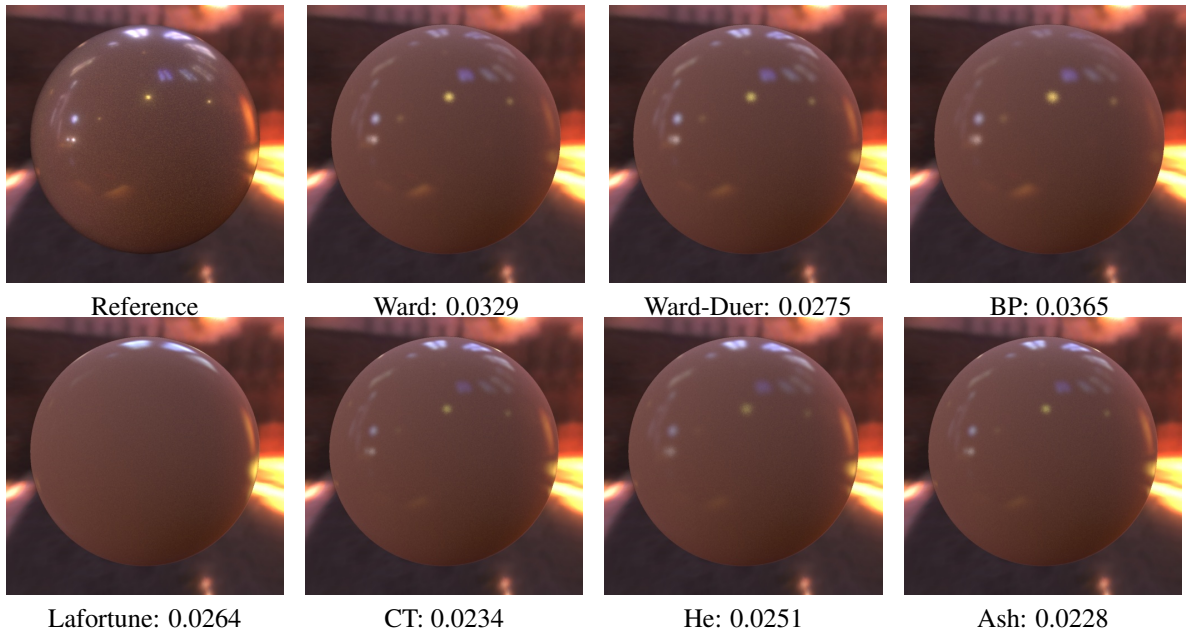
He

Material Name: pink-jasper

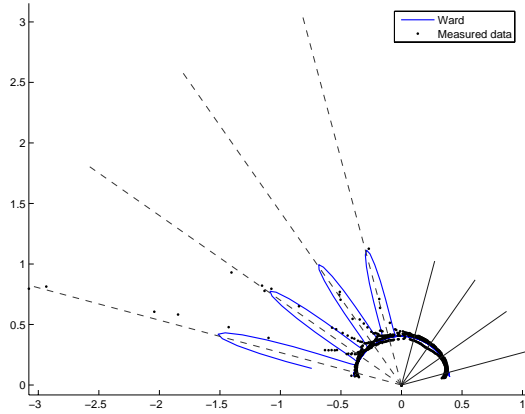
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.201	0.108	0.0596	0.014	0.0126	0.00889	0.028			0.0329
Ward-Duer	0.2	0.108	0.0592	0.0098	0.00969	0.00691	0.0302			0.0275
Blinn-Phong	0.201	0.109	0.0599	0.00494	0.00423	0.00294	1.75e+003			0.0365
Lafortune et al.	0.205	0.112	0.062	0.503	0.644	0.434	-0.581	0.569	1.06e+003	0.0264
Cook-Torrance	0.203	0.109	0.0604	0.0509	0.0571	0.0403	0.0683	0.0274		0.0234
He et al.	0.202	0.109	0.0601	0.0821	0.0901	0.0647	28	0.531	1.58	0.0251
Ashikhmin-Shirley	0.202	0.109	0.0603	0.0543	0.0616	0.043	0.0816	2.59e+003		0.0228

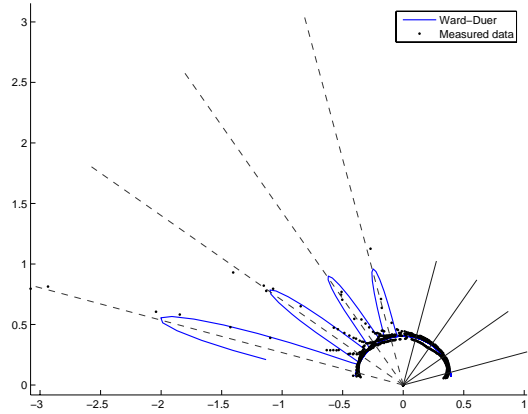
Rendered Images



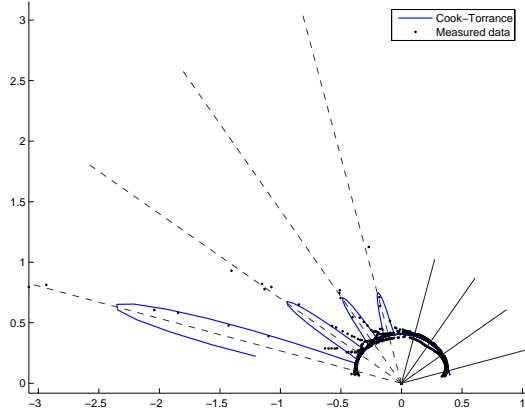
BRDF Plots in the incidence plane (Cubic root applied)



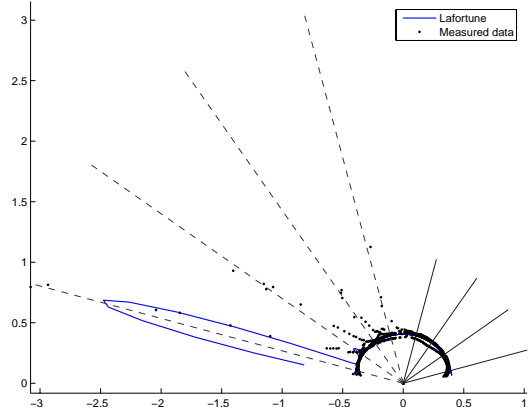
Ward



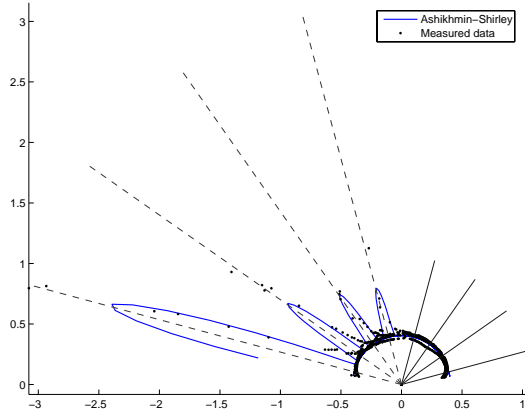
Ward-Duer



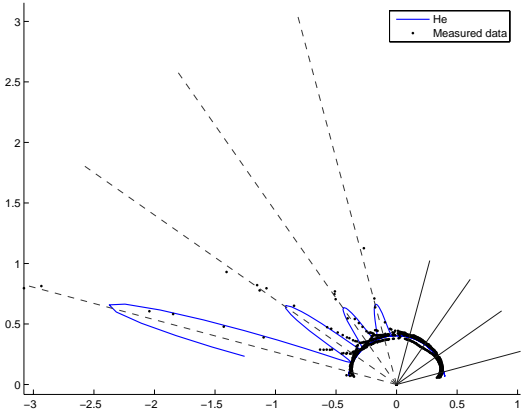
Cook-Torrance



Lafortune



Ashikhmin-Shirley



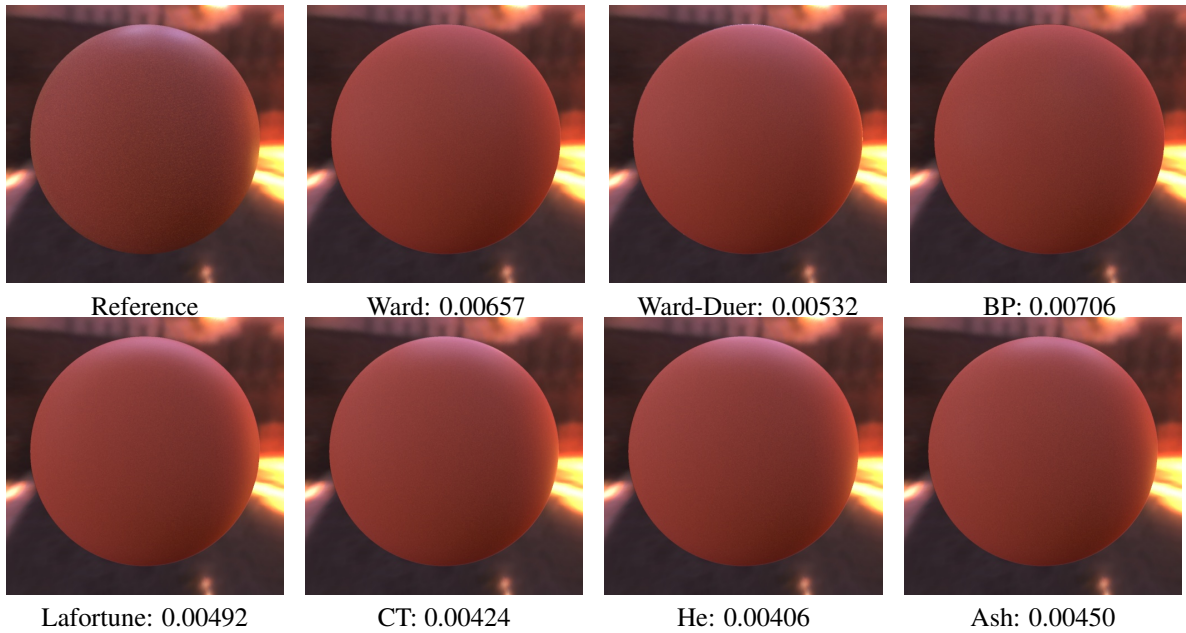
He

Material Name: pink-plastic

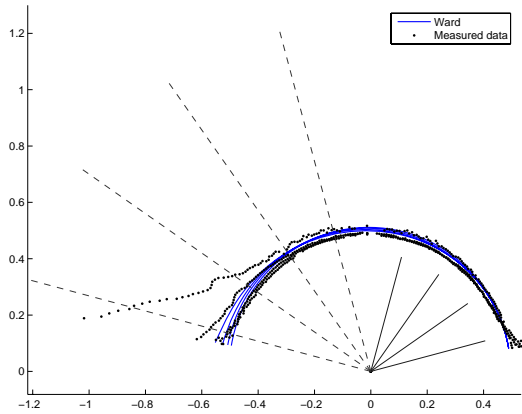
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.375	0.0736	0.0357	0.0383	0.0321	0.0235	0.5			0.00657
Ward-Duer	0.367	0.0715	0.0344	0.0366	0.0241	0.0173	0.5			0.00532
Blinn-Phong	0.388	0.0835	0.043	0.00137	0.00204	0.00146	33.1			0.00706
Lafortune et al.	0.385	0.0836	0.0431	0.186	0.118	0.0844	-0.673	0.305	13.3	0.00492
Cook-Torrance	0.382	0.0811	0.0414	0.202	0.136	0.0959	0.0282	0.352		0.00424
He et al.	0.381	0.0805	0.0409	0.916	0.606	0.427	4	0.902	1.19	0.00406
Ashikhmin-Shirley	0.383	0.0816	0.0418	0.227	0.159	0.112	0.0367	16.1		0.0045

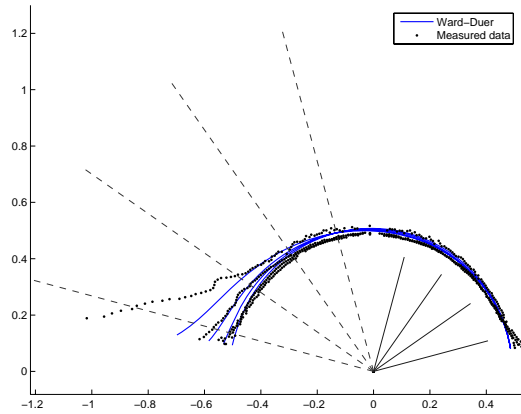
Rendered Images



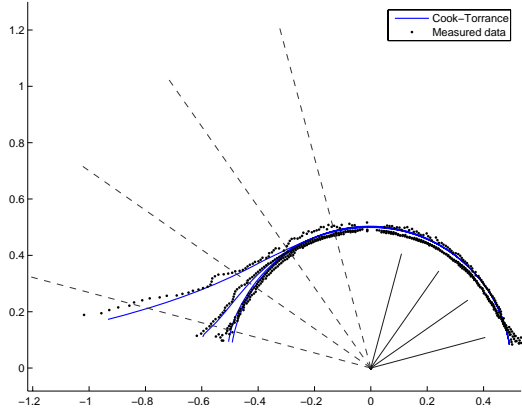
BRDF Plots in the incidence plane (Cubic root applied)



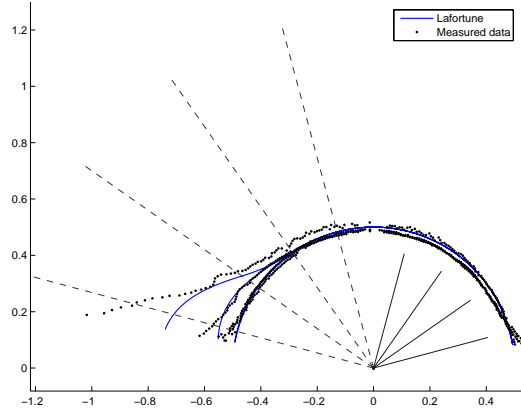
Ward



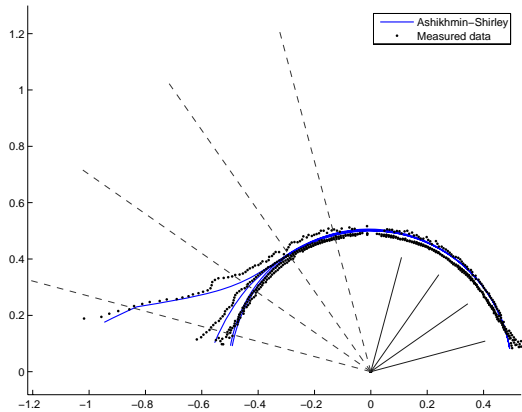
Ward-Duer



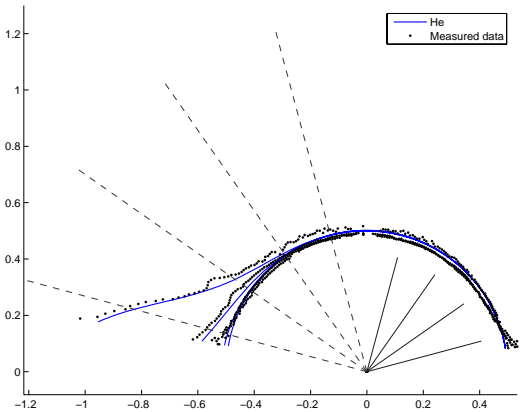
Cook-Torrance



Lafortune



Ashikhmin-Shirley



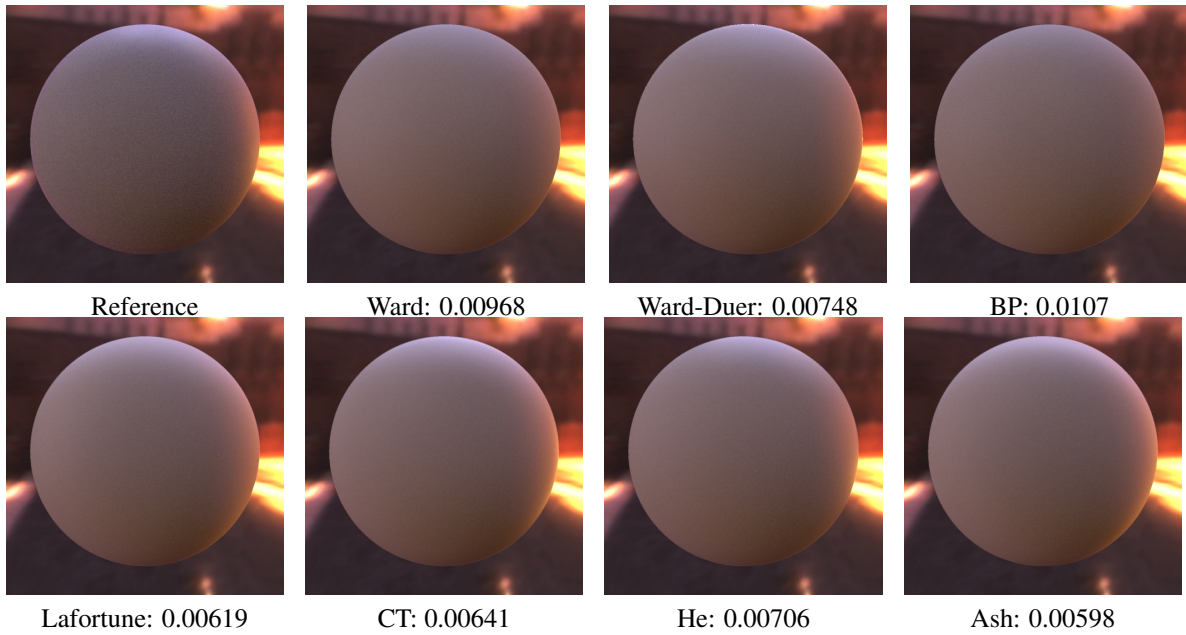
He

Material Name: polyethylene

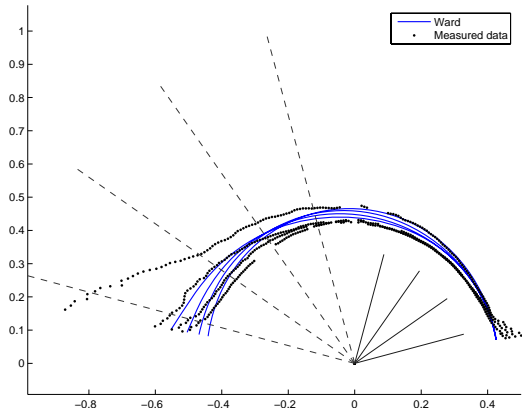
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.245	0.217	0.15	0.0673	0.0625	0.0363	0.5			0.00968
Ward-Duer	0.237	0.213	0.147	0.0559	0.0469	0.0278	0.5			0.00748
Blinn-Phong	0.267	0.236	0.161	0.00362	0.00425	0.00259	22.8			0.0107
Lafortune et al.	0.253	0.228	0.155	0.275	0.216	0.131	-0.707	0.000228	3.16	0.00619
Cook-Torrance	0.236	0.214	0.147	0.442	0.354	0.215	0.0855	0.643		0.00641
He et al.	0.254	0.227	0.155	0.557	0.457	0.282	20	4.03	1.45	0.00706
Ashikhmin-Shirley	0.184	0.173	0.122	0.773	0.608	0.373	0.36	0.926		0.00598

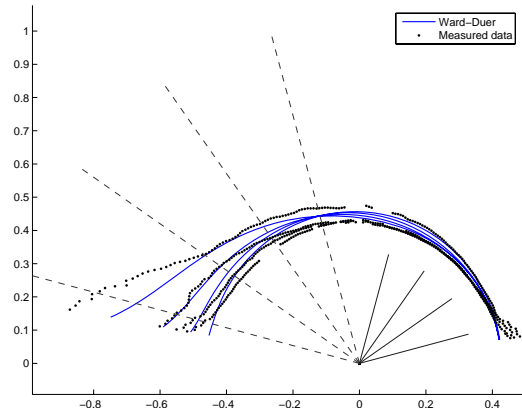
Rendered Images



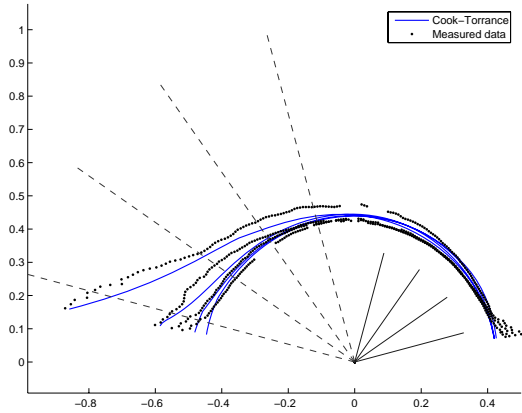
BRDF Plots in the incidence plane (Cubic root applied)



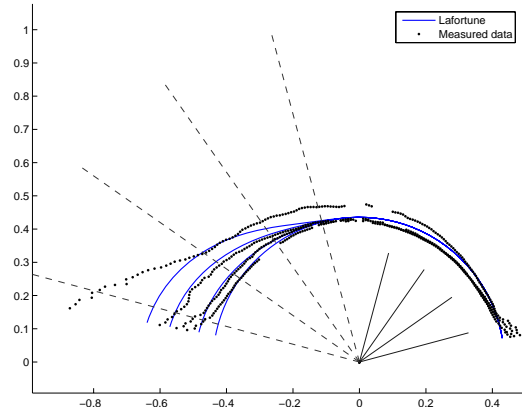
Ward



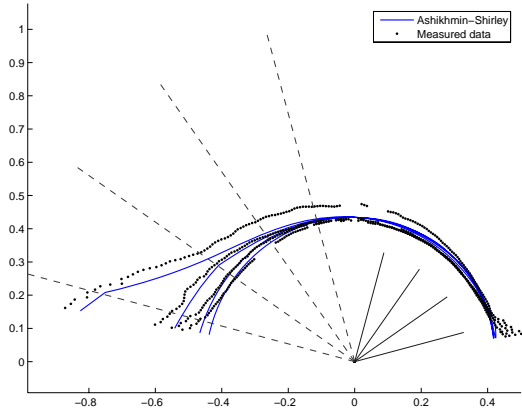
Ward-Duer



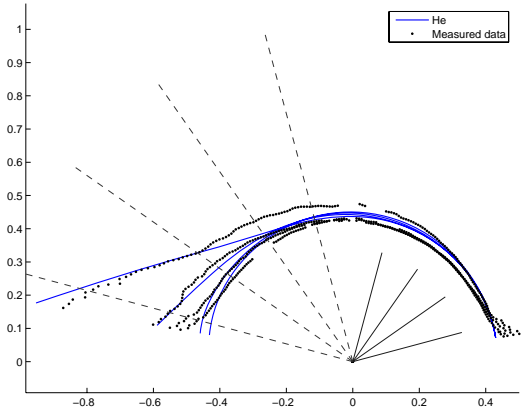
Cook-Torrance



Lafortune



Ashikhmin-Shirley



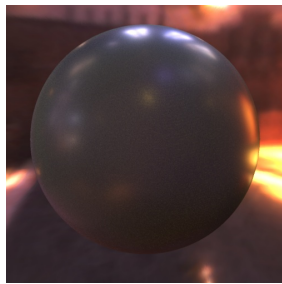
He

Material Name: polypropylene

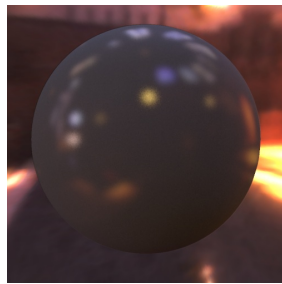
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.0553	0.0583	0.0439	0.0285	0.0225	0.0144	0.0475			0.0648
Ward-Duer	0.0516	0.0554	0.0421	0.0238	0.0187	0.0119	0.0437			0.0484
Blinn-Phong	0.0555	0.0578	0.0432	0.00934	0.00771	0.00512	249			0.0703
Lafortune et al.	0.0685	0.0687	0.0506	0.41	0.319	0.202	-0.58	0.573	1.38e+003	0.0408
Cook-Torrance	0.0634	0.0647	0.048	0.217	0.171	0.11	0.0183	0.0429		0.0182
He et al.	0.0643	0.0653	0.0484	0.552	0.437	0.28	20	0.476	1.13	0.0153
Ashikhmin-Shirley	0.0633	0.0646	0.0479	0.206	0.162	0.104	0.0249	1e+003		0.0176

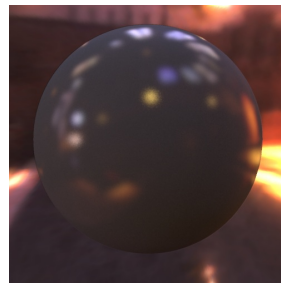
Rendered Images



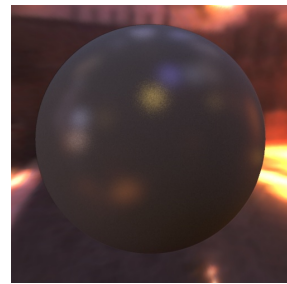
Reference



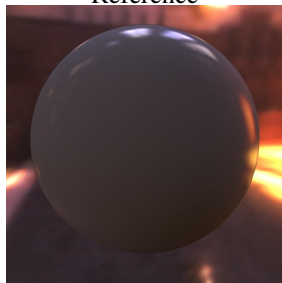
Ward: 0.0648



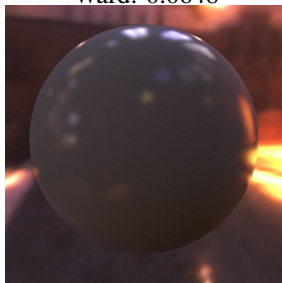
Ward-Duer: 0.0484



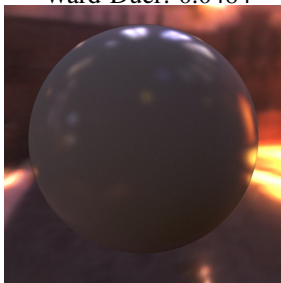
BP: 0.0703



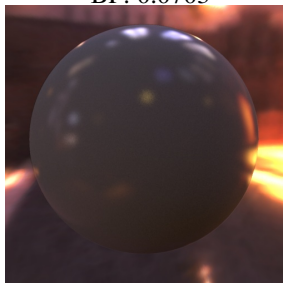
Lafortune: 0.0408



CT: 0.0182

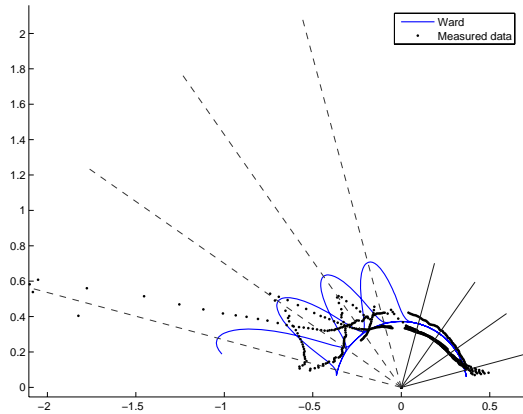


He: 0.0153

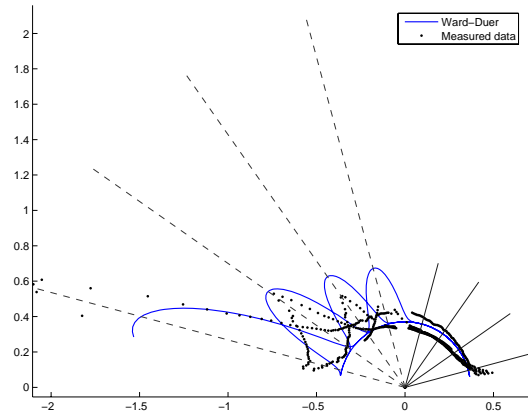


Ash: 0.0176

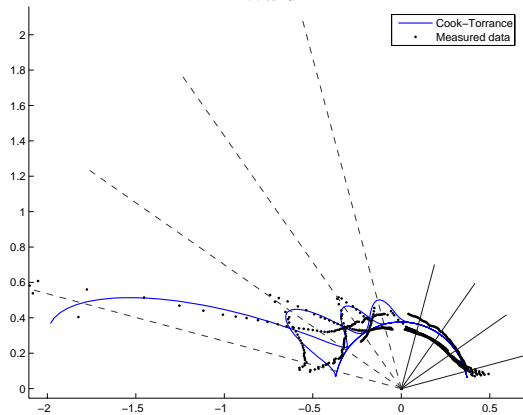
BRDF Plots in the incidence plane (Cubic root applied)



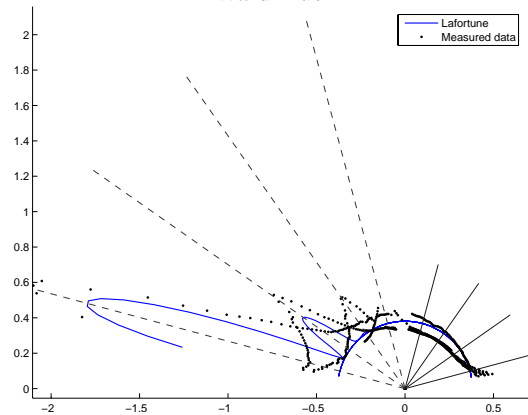
Ward



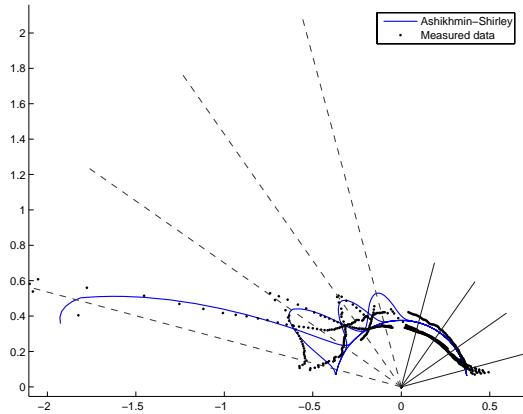
Ward-Duer



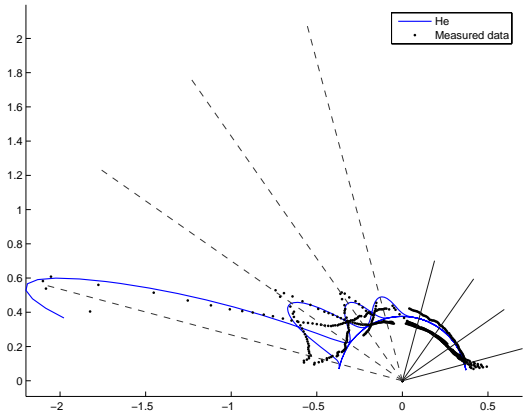
Cook-Torrance



Lafortune



Ashikhmin-Shirley



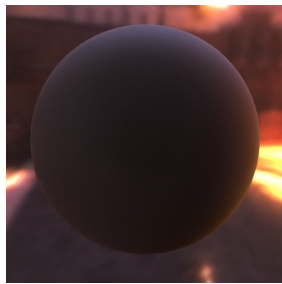
He

Material Name: polyurethane

Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.0125	0.00952	0.00674	0.0177	0.0145	0.00982	0.5			0.00262
Ward-Duer	0.0104	0.00799	0.00571	0.0147	0.0118	0.00794	0.5			0.00204
Blinn-Phong	0.0194	0.0152	0.0105	0.000311	0.000266	0.000179	97.4			0.0029
Lafortune et al.	0.0153	0.0119	0.00838	0.0914	0.0728	0.049	-0.707	2.17e-008	4.31	0.00117
Cook-Torrance	0.0106	0.00819	0.00584	0.174	0.138	0.0932	0.0509	0.701		0.00126
He et al.	0.011	0.00857	0.00611	5.52	4.36	2.94	1	0.501	1.1	0.00117
Ashikhmin-Shirley	0	0	0	0.39	0.307	0.211	0.182	0.609		0.000906

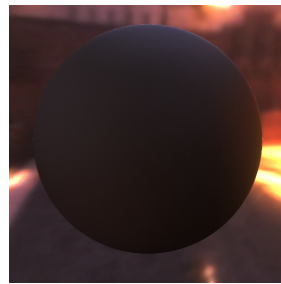
Rendered Images



Reference



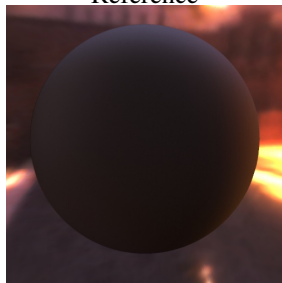
Ward: 0.00262



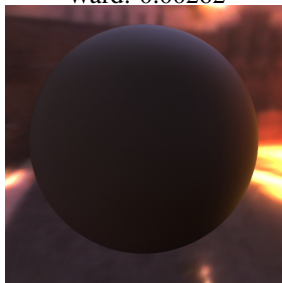
Ward-Duer: 0.00204



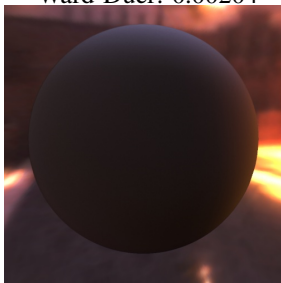
BP: 0.00290



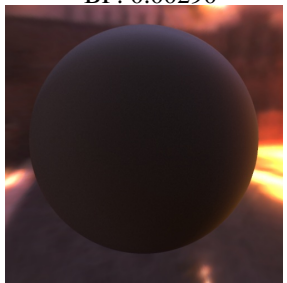
Lafortune: 0.00117



CT: 0.00126

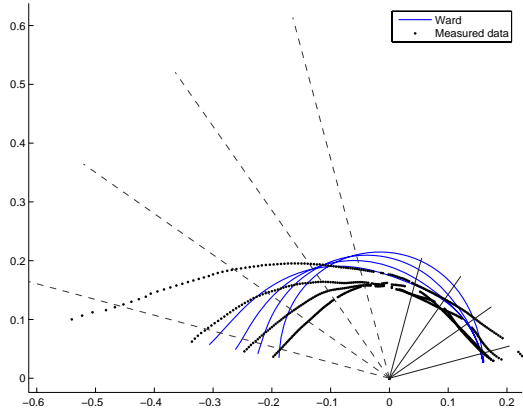


He: 0.00117

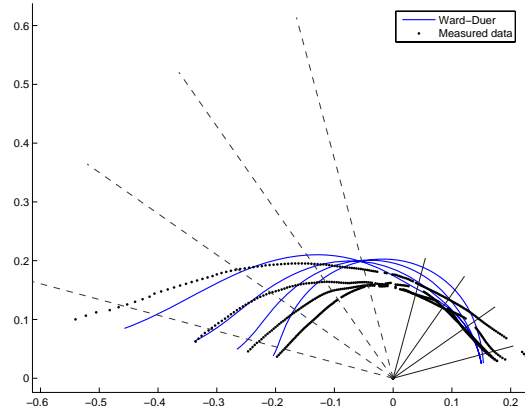


Ash: 0.000906

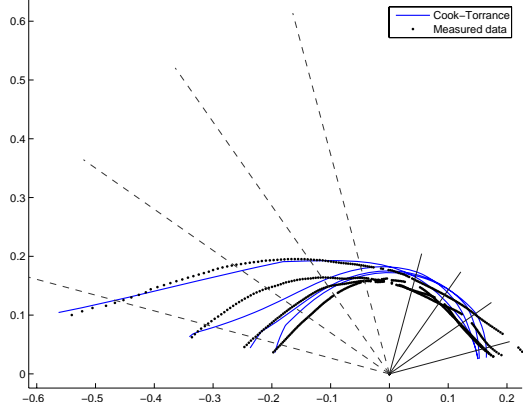
BRDF Plots in the incidence plane (Cubic root applied)



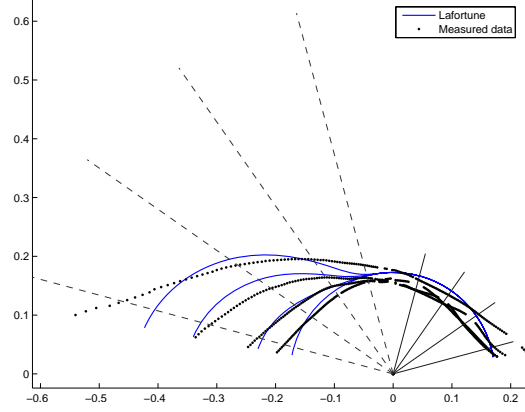
Ward



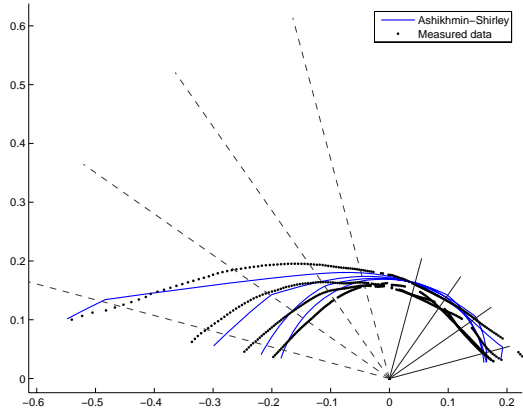
Ward-Duer



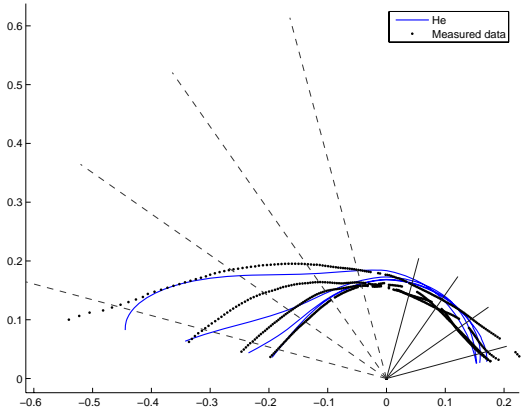
Cook-Torrance



Lafortune



Ashikhmin-Shirley



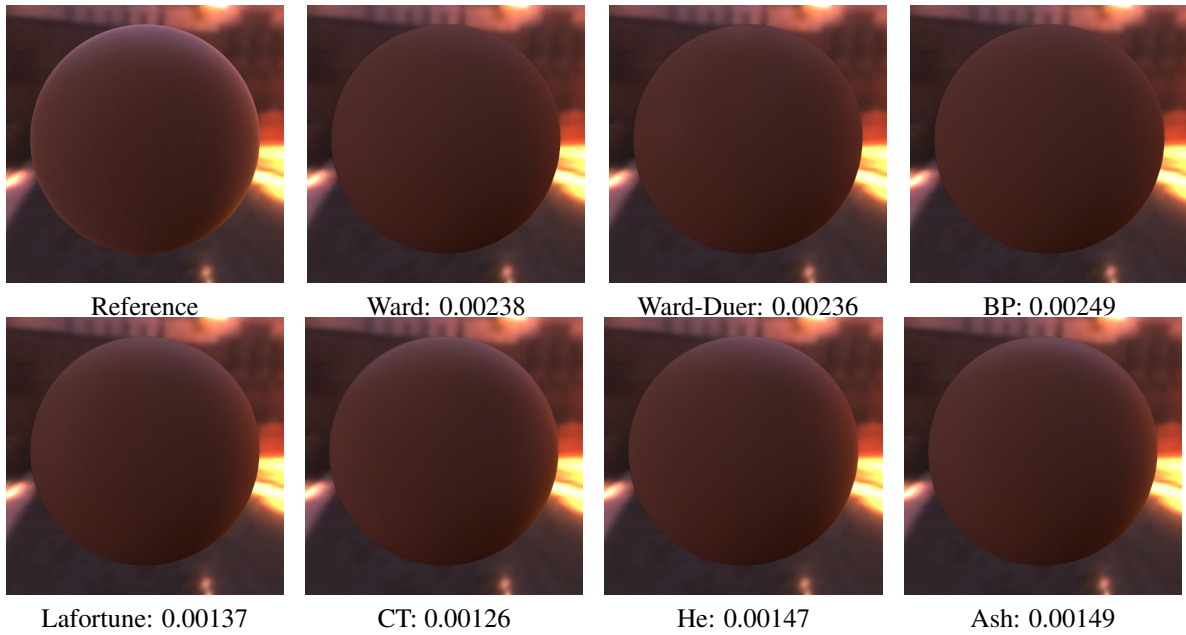
He

Material Name: polyurethane-foam

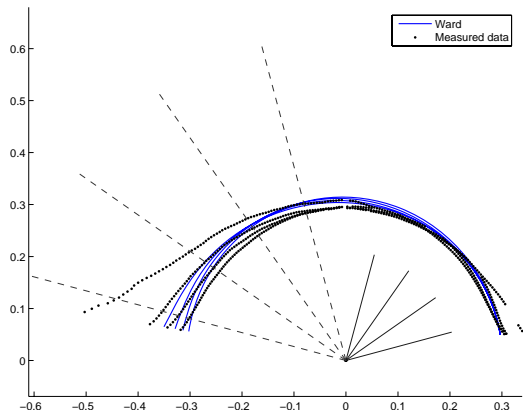
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.0825	0.0297	0.0153	0.0123	0.00597	0.00296	0.5			0.00238
Ward-Duer	0.0862	0.0314	0.016	0.00174	0.001	0.000598	0.178			0.00236
Blinn-Phong	0.0876	0.0322	0.0165	0	0	0	1.45			0.00249
Lafortune et al.	0.0827	0.0295	0.0149	0.0755	0.0416	0.0255	-0.707	3.69e-007	3.51	0.00137
Cook-Torrance	0.0663	0.0205	0.00926	0.144	0.0792	0.0491	0.206	0.943		0.00126
He et al.	0.0753	0.0255	0.0123	0.758	0.418	0.261	3.97	1.59	1.37	0.00147
Ashikhmin-Shirley	0.0718	0.0233	0.0111	0.189	0.107	0.0657	0.2	2		0.00149

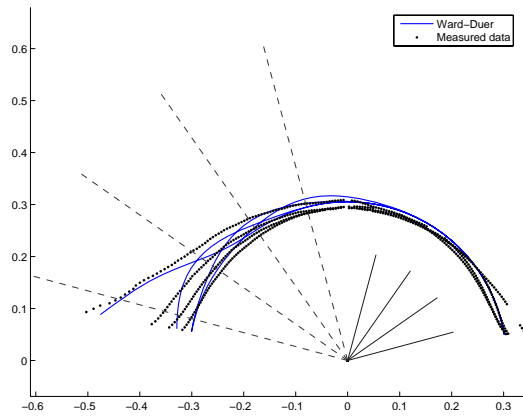
Rendered Images



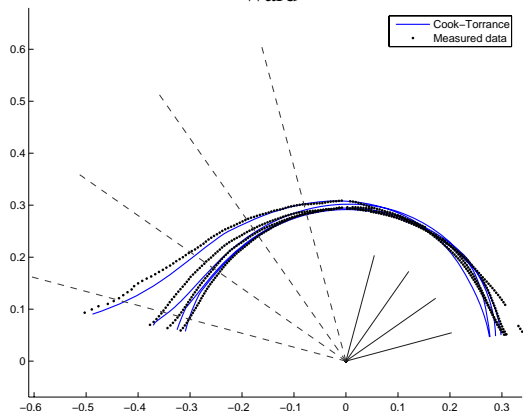
BRDF Plots in the incidence plane (Cubic root applied)



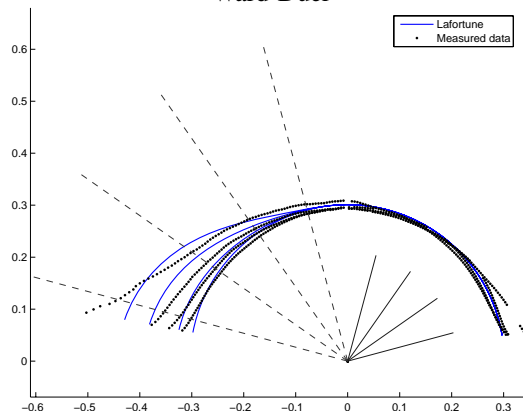
Ward



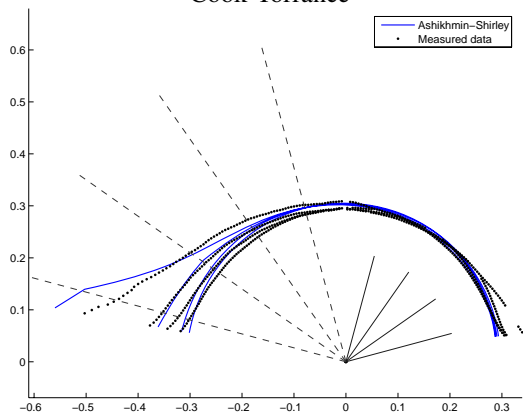
Ward-Duer



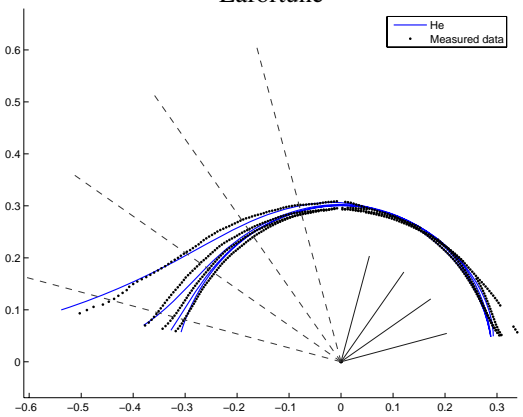
Cook-Torrance



Lafortune



Ashikhmin-Shirley



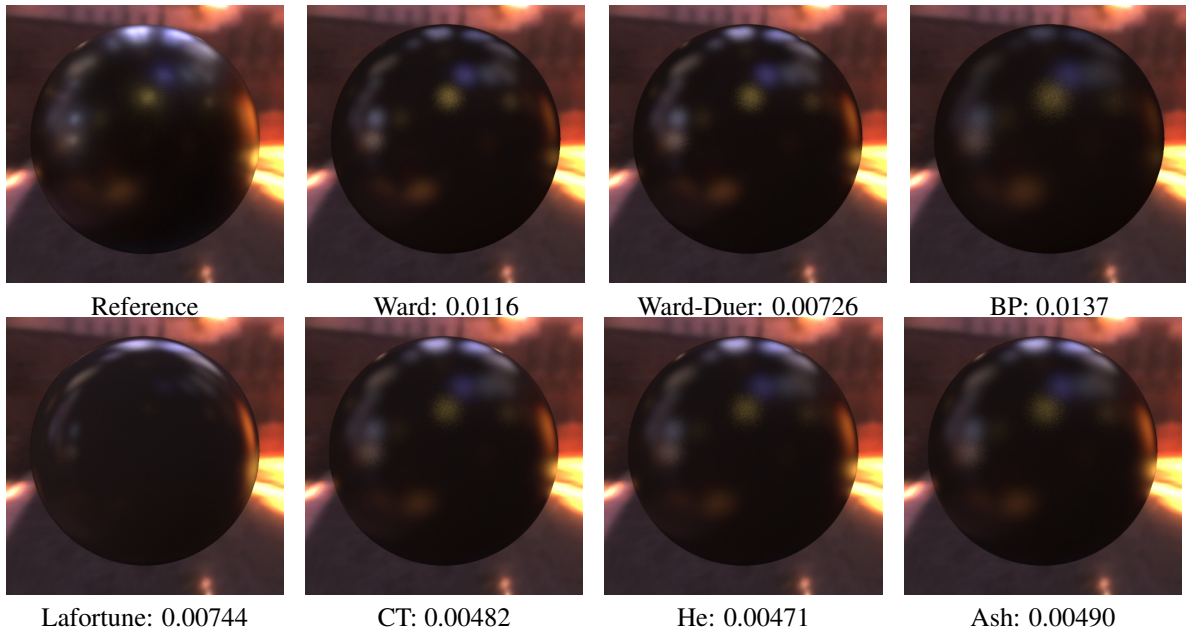
He

Material Name: provincial-211

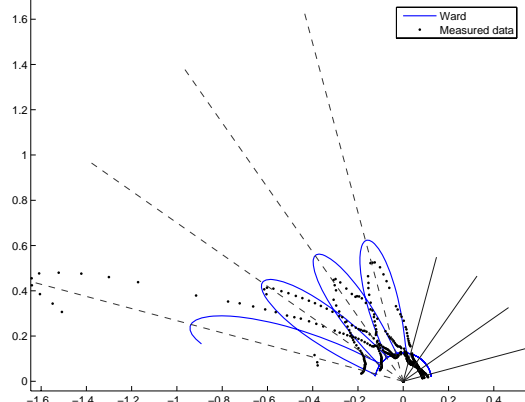
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.00585	0.00336	0.00217	0.0165	0.0134	0.00921	0.0719			0.0116
Ward-Duer	0.00494	0.0027	0.00164	0.0135	0.0108	0.00739	0.0755			0.00726
Blinn-Phong	0.00498	0.00255	0.00151	0.00536	0.00443	0.00304	188			0.0137
Lafortune et al.	0.0108	0.00762	0.00559	0.196	0.152	0.103	-0.584	0.564	237	0.00744
Cook-Torrance	0.00608	0.00371	0.00248	0.0819	0.0651	0.044	0.114	0.0864		0.00482
He et al.	0.00597	0.00362	0.00241	0.0985	0.0782	0.0529	28	1.23	1.91	0.00471
Ashikhmin-Shirley	0.0051	0.00287	0.00183	0.107	0.0851	0.0574	0.111	221		0.0049

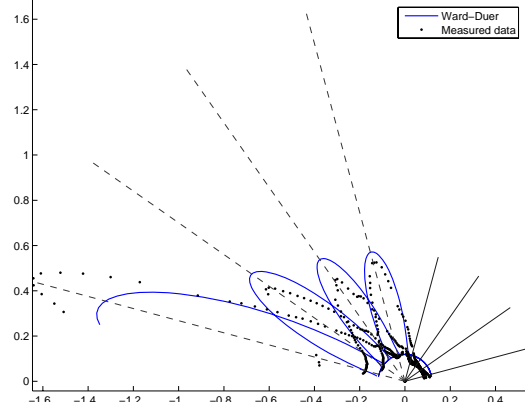
Rendered Images



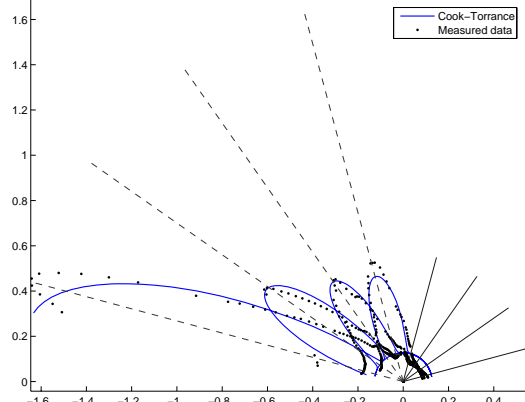
BRDF Plots in the incidence plane (Cubic root applied)



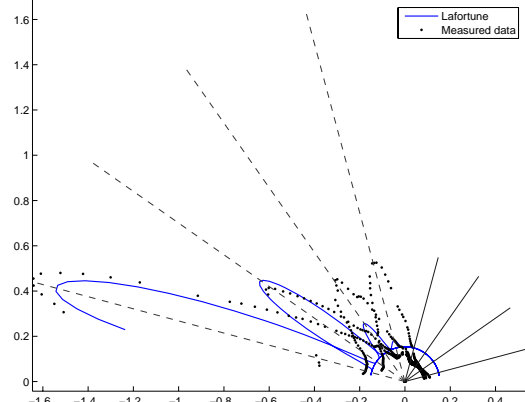
Ward



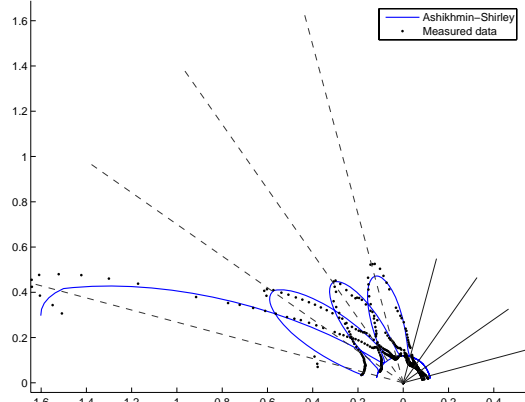
Ward-Duer



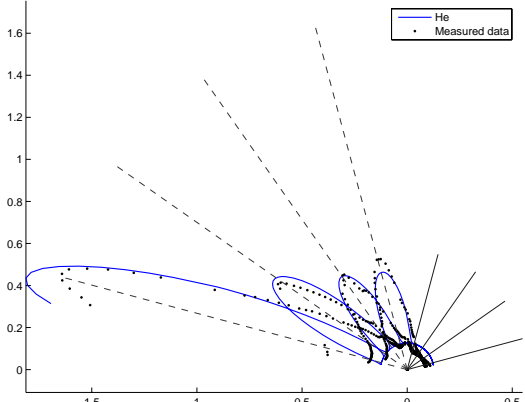
Cook-Torrance



Lafortune



Ashikhmin-Shirley



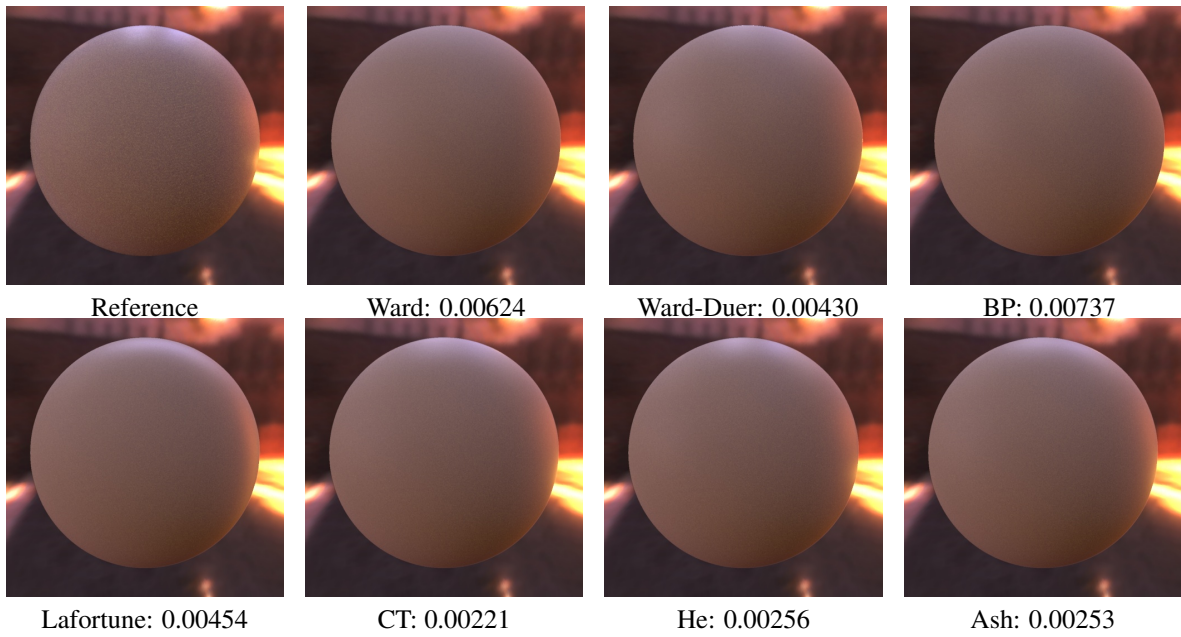
He

Material Name: pure-rubber

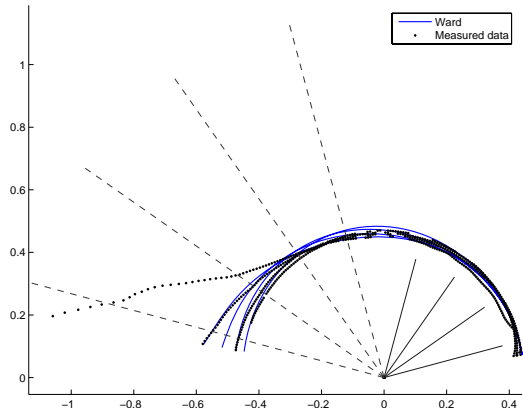
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.274	0.208	0.123	0.0496	0.0407	0.0227	0.399			0.00624
Ward-Duer	0.279	0.213	0.125	0.0233	0.0189	0.0116	0.293			0.0043
Blinn-Phong	0.289	0.22	0.13	0.00497	0.00421	0.0021	38.3			0.00737
Lafortune et al.	0.294	0.224	0.132	0.188	0.15	0.0995	-0.638	0.432	29.9	0.00454
Cook-Torrance	0.287	0.219	0.129	0.141	0.113	0.0727	0.056	0.267		0.00221
He et al.	0.289	0.221	0.13	0.169	0.135	0.0869	19.9	2.13	1.49	0.00256
Ashikhmin-Shirley	0.285	0.217	0.127	0.21	0.168	0.107	0.0751	19.9		0.00253

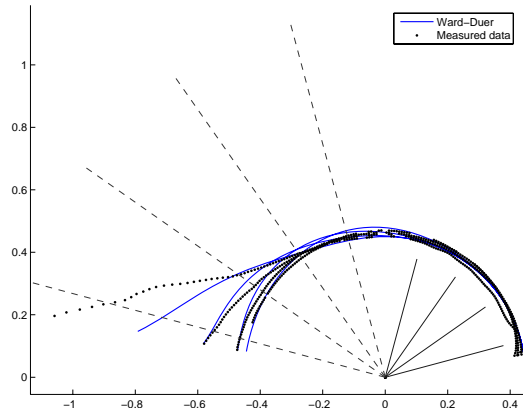
Rendered Images



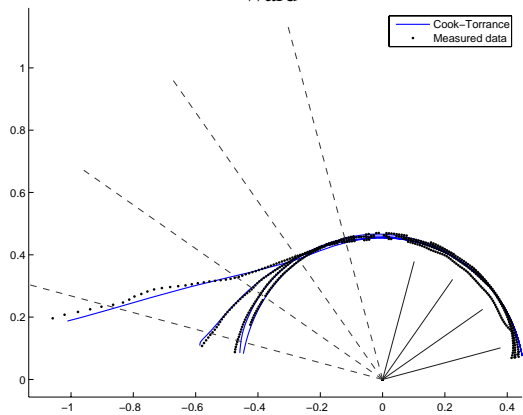
BRDF Plots in the incidence plane (Cubic root applied)



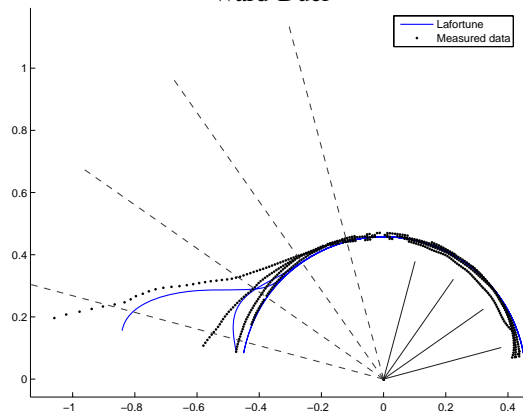
Ward



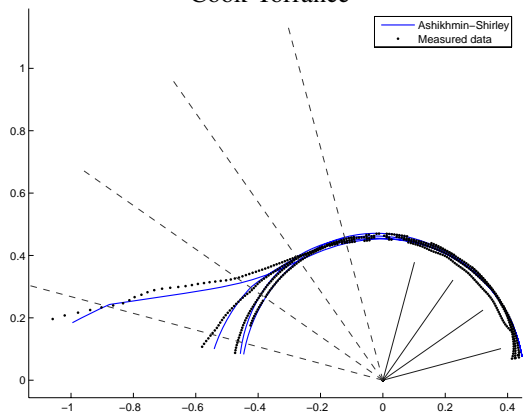
Ward-Duer



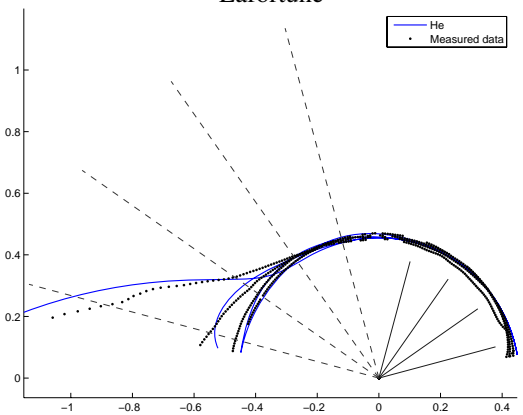
Cook-Torrance



Lafortune



Ashikhmin-Shirley



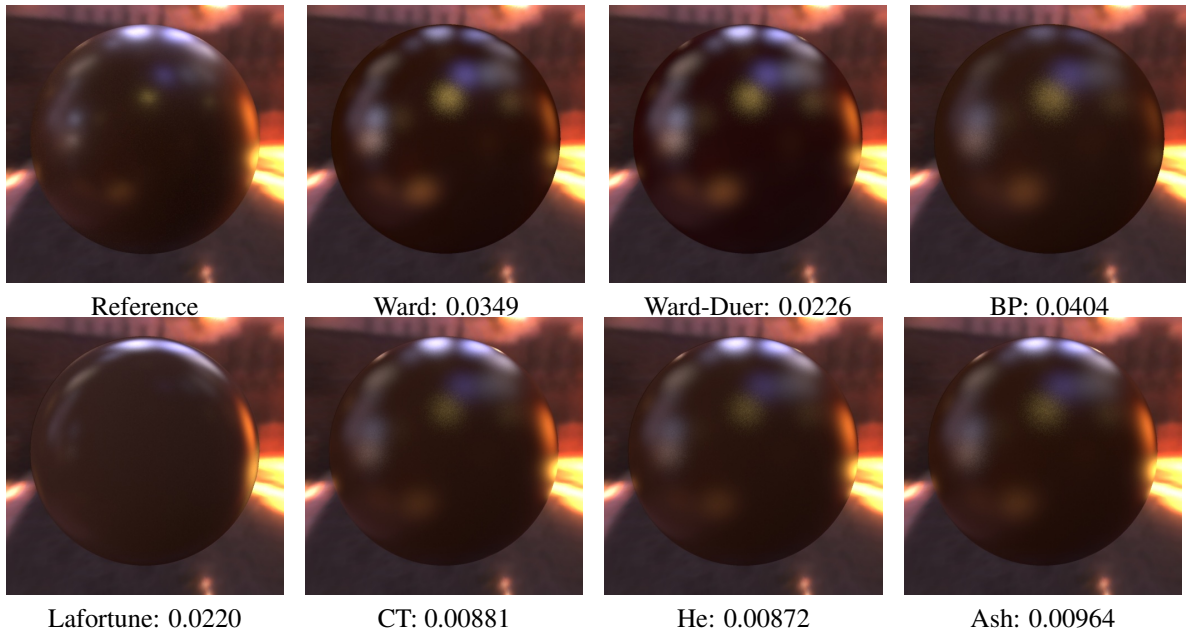
He

Material Name: puritan-pine-218

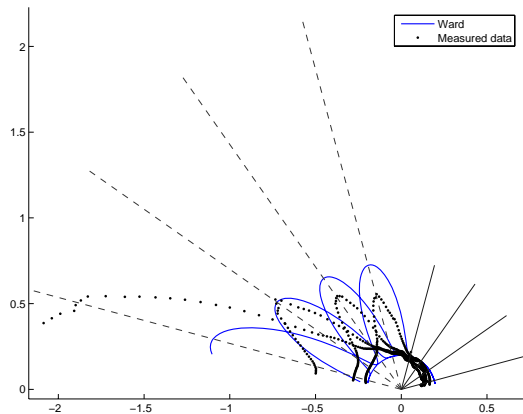
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.0236	0.00364	0	0.0466	0.0399	0.0271	0.0967			0.0349
Ward-Duer	0.0189	0	0	0.0375	0.0323	0.0218	0.101			0.0226
Blinn-Phong	0.0275	0.00723	0.00123	0.0131	0.0111	0.00757	132			0.0404
Lafortune et al.	0.0415	0.0189	0.00925	0.459	0.398	0.267	-0.59	0.551	154	0.022
Cook-Torrance	0.0293	0.00829	0.00206	0.267	0.231	0.156	0.0593	0.113		0.00881
He et al.	0.0294	0.0084	0.00214	0.356	0.309	0.209	28	1.6	1.53	0.00872
Ashikhmin-Shirley	0.0269	0.00622	0.000719	0.339	0.294	0.198	0.0681	131		0.00964

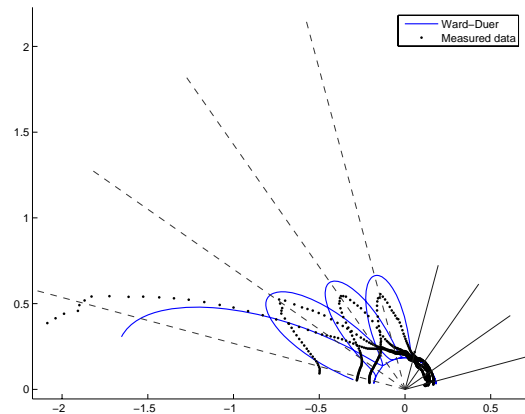
Rendered Images



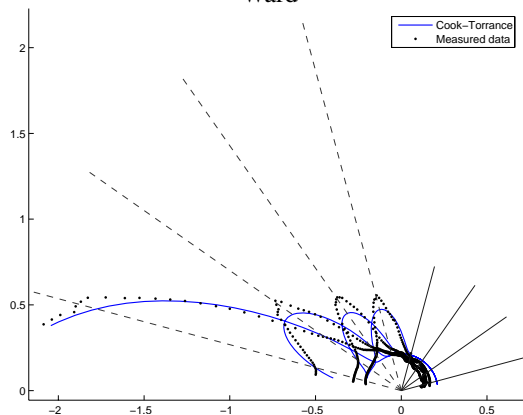
BRDF Plots in the incidence plane (Cubic root applied)



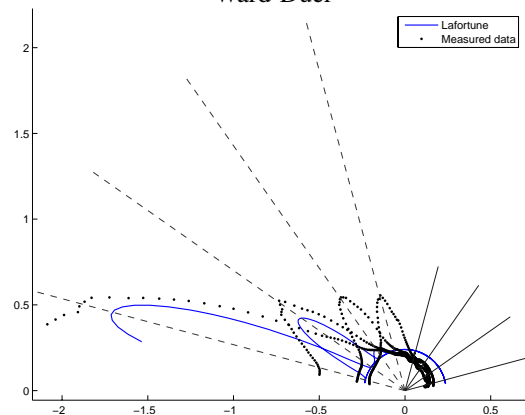
Ward



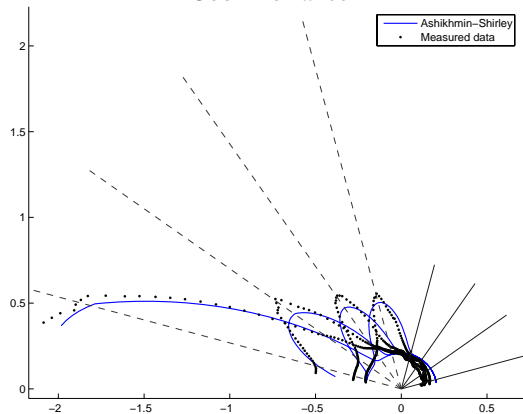
Ward-Duer



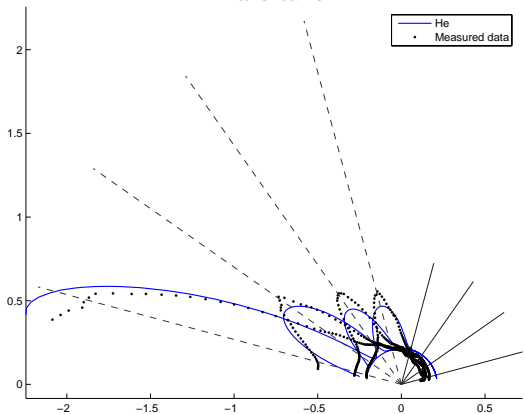
Cook-Torrance



Lafortune



Ashikhmin-Shirley



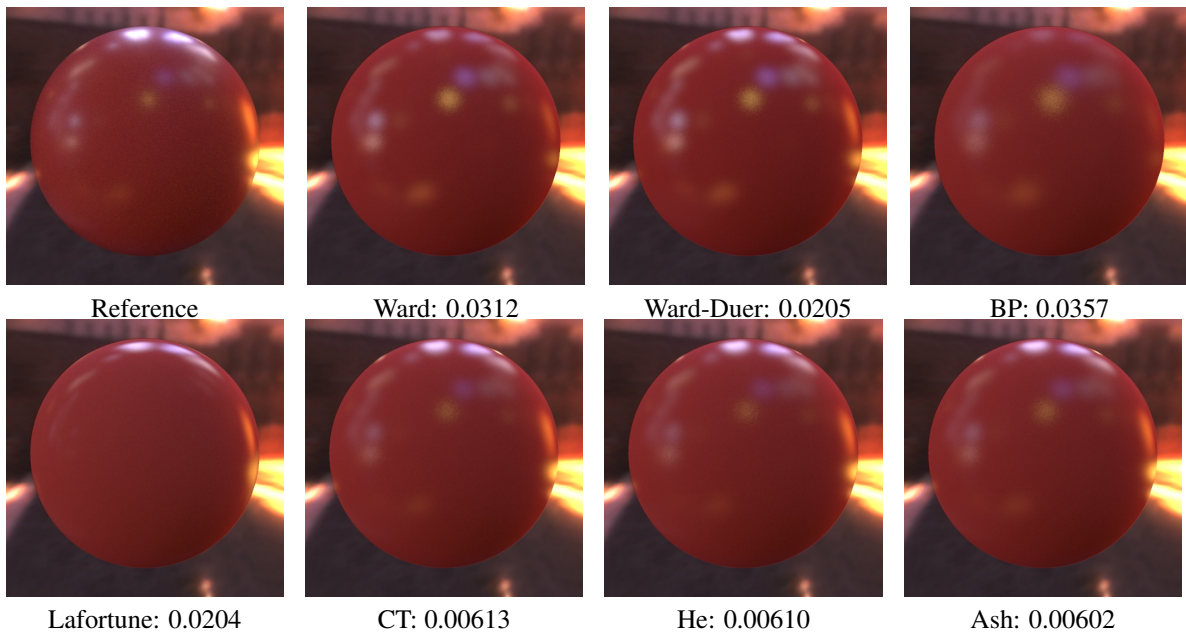
He

Material Name: purple-paint

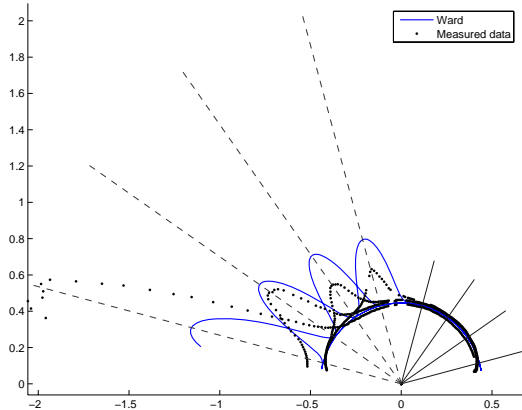
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.271	0.0256	0.0174	0.0299	0.0244	0.0165	0.0724			0.0312
Ward-Duer	0.269	0.0232	0.0158	0.0234	0.0194	0.013	0.0727			0.0205
Blinn-Phong	0.273	0.0276	0.0186	0.00872	0.0069	0.00475	215			0.0357
Lafortune et al.	0.284	0.0356	0.0242	0.3	0.252	0.168	-0.584	0.564	346	0.0204
Cook-Torrance	0.277	0.0296	0.0202	0.164	0.137	0.0916	0.0503	0.0782		0.00613
He et al.	0.276	0.0294	0.0201	0.204	0.171	0.114	28	1.13	1.51	0.0061
Ashikhmin-Shirley	0.275	0.0286	0.0196	0.192	0.16	0.107	0.0618	290		0.00602

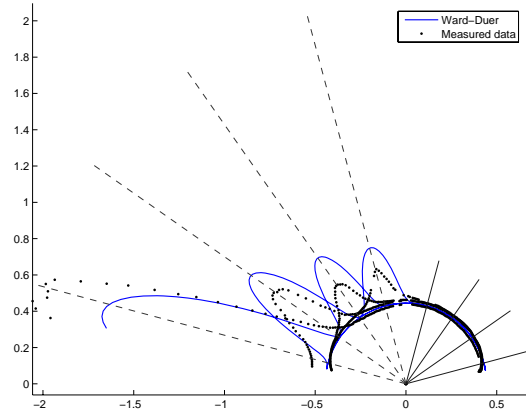
Rendered Images



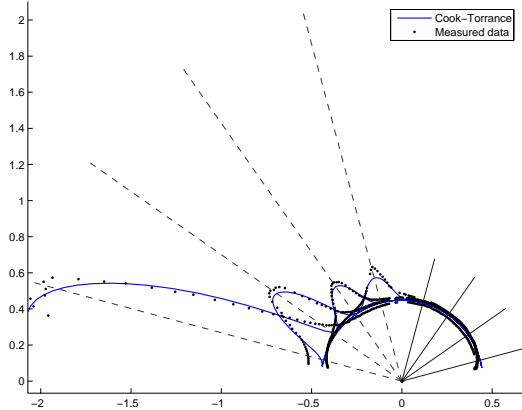
BRDF Plots in the incidence plane (Cubic root applied)



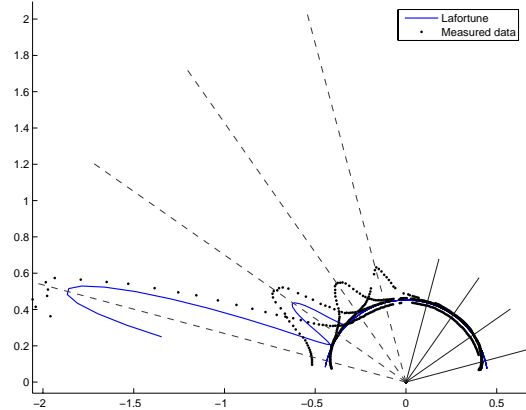
Ward



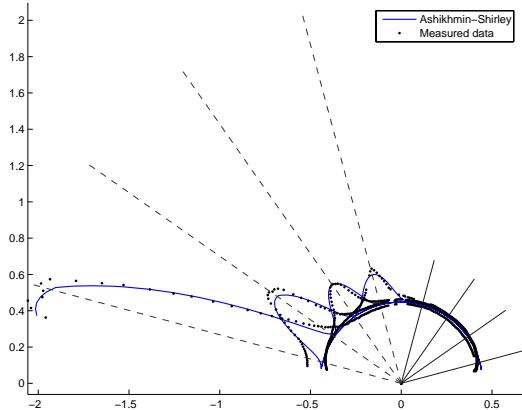
Ward-Duer



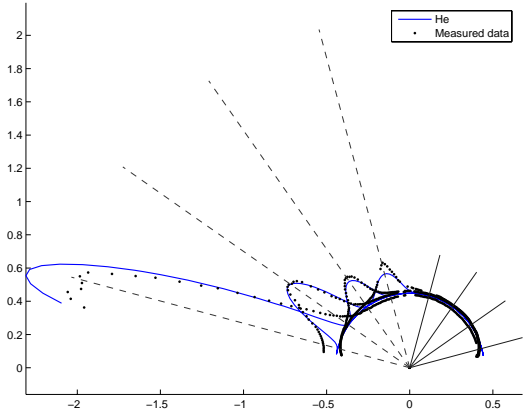
Cook-Torrance



Lafortune



Ashikhmin-Shirley



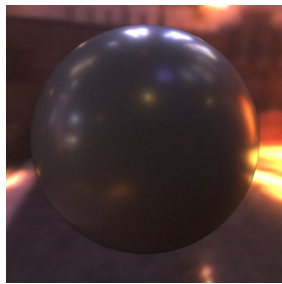
He

Material Name: pvc

Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.0326	0.0318	0.0244	0.0241	0.0178	0.0111	0.0399			0.0434
Ward-Duer	0.0306	0.0305	0.0234	0.0203	0.0148	0.00953	0.0412			0.0322
Blinn-Phong	0.0316	0.0308	0.0238	0.00814	0.00619	0.00395	372			0.0486
Lafortune et al.	0.0383	0.0362	0.0272	1.07	0.764	0.522	-0.584	0.564	450	0.0183
Cook-Torrance	0.0362	0.0348	0.0262	0.16	0.11	0.0752	0.0277	0.0387		0.0163
He et al.	0.0362	0.0347	0.0262	0.253	0.179	0.122	24	0.535	1.28	0.0157
Ashikhmin-Shirley	0.0358	0.0345	0.026	0.169	0.115	0.0792	0.0391	1.17e+003		0.0163

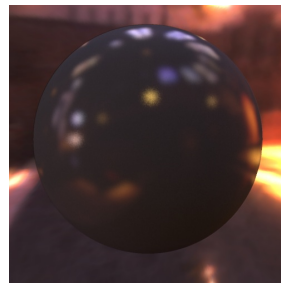
Rendered Images



Reference



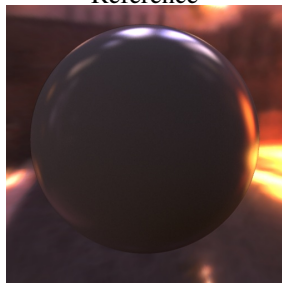
Ward: 0.0434



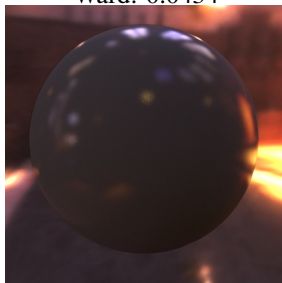
Ward-Duer: 0.0322



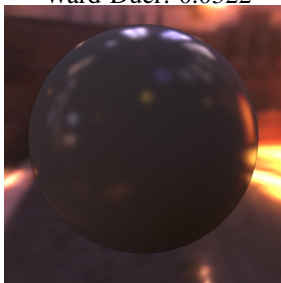
BP: 0.0486



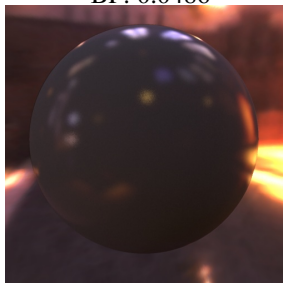
Lafortune: 0.0183



CT: 0.0163

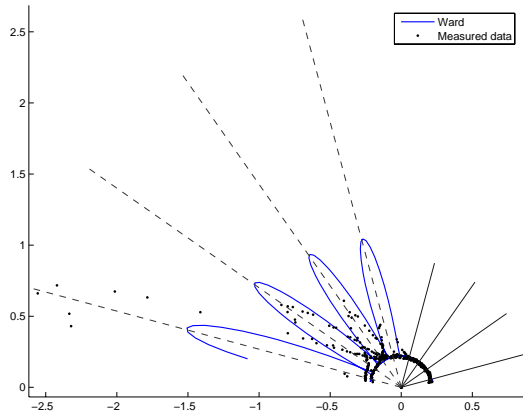


He: 0.0157

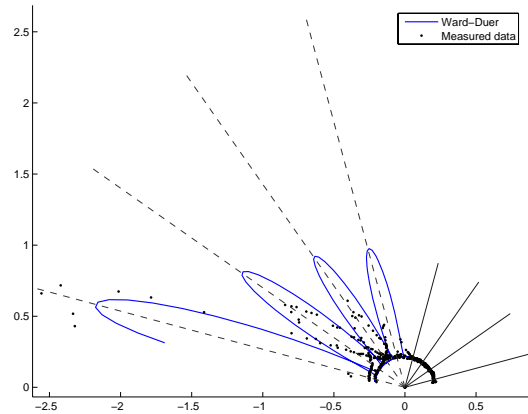


Ash: 0.0163

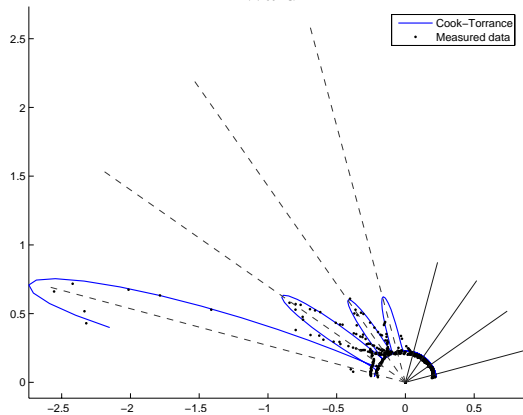
BRDF Plots in the incidence plane (Cubic root applied)



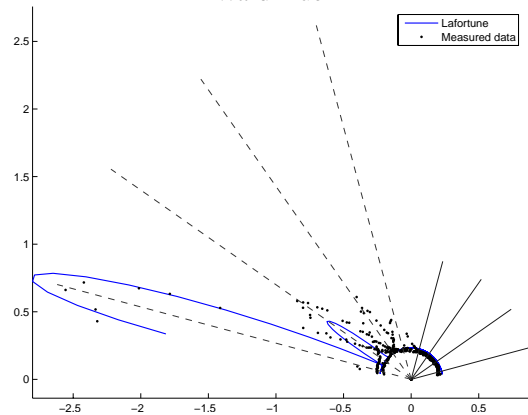
Ward



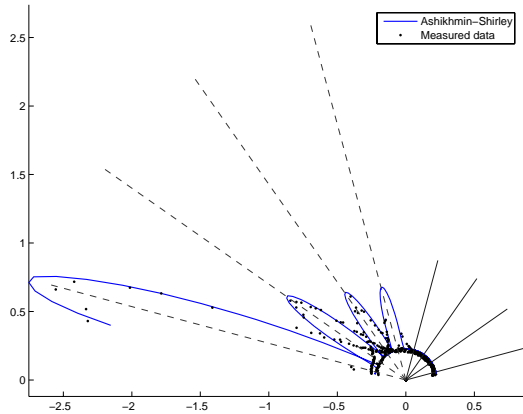
Ward-Duer



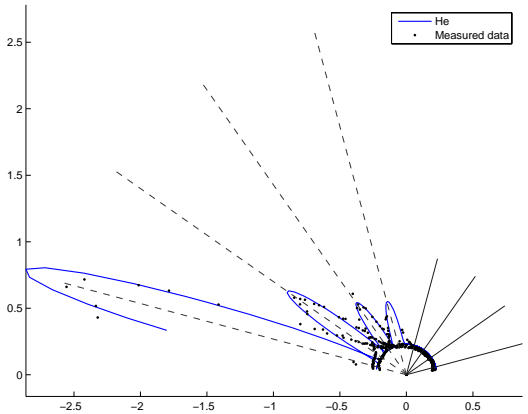
Cook-Torrance



Lafortune



Ashikhmin-Shirley



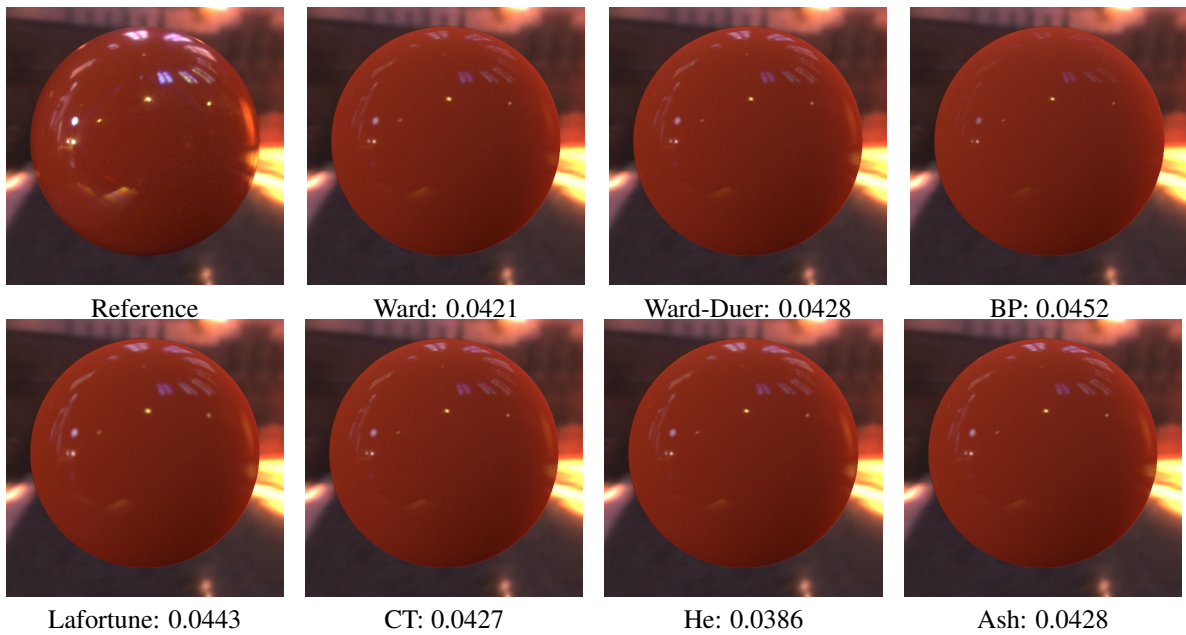
He

Material Name: red-bball

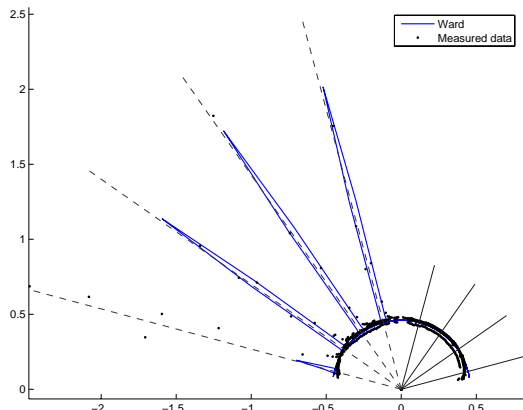
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.3	0.0304	0.00556	0.00588	0.00479	0.00314	0.00719			0.0421
Ward-Duer	0.3	0.0306	0.00569	0.00403	0.00325	0.00218	0.00669			0.0428
Blinn-Phong	0.302	0.0316	0.00636	0.00093	0.000782	0.000514	1.04e+005			0.0452
Lafortune et al.	0.299	0.0295	0.00488	0.0183	0.0142	0.0101	-0.577	0.577	3.95e+003	0.0443
Cook-Torrance	0.3	0.0306	0.00567	0.00729	0.00588	0.00394	0.57	0.00677		0.0427
He et al.	0.3	0.0299	0.00522	25.8	20.7	14.1	28	0.01	1.26	0.0386
Ashikhmin-Shirley	0.3	0.0306	0.00568	0.00694	0.0056	0.00376	0.581	4.41e+004		0.0428

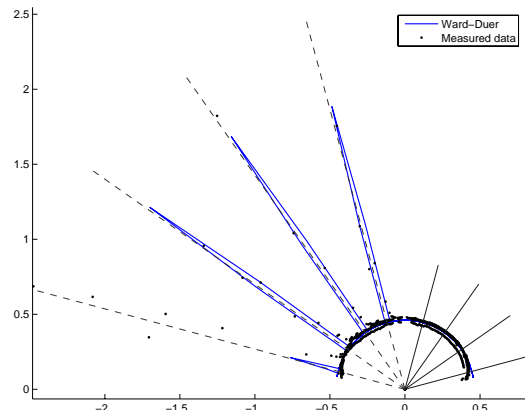
Rendered Images



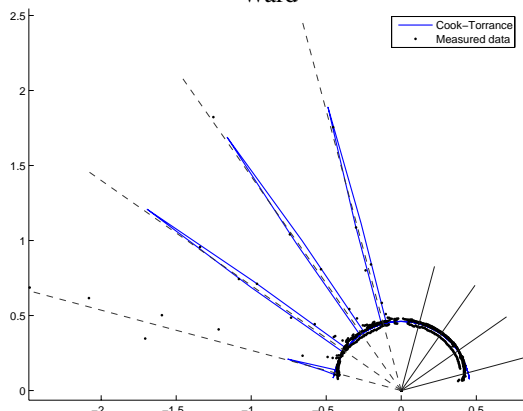
BRDF Plots in the incidence plane (Cubic root applied)



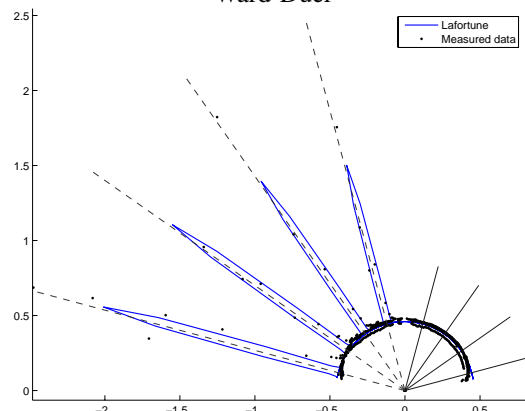
Ward



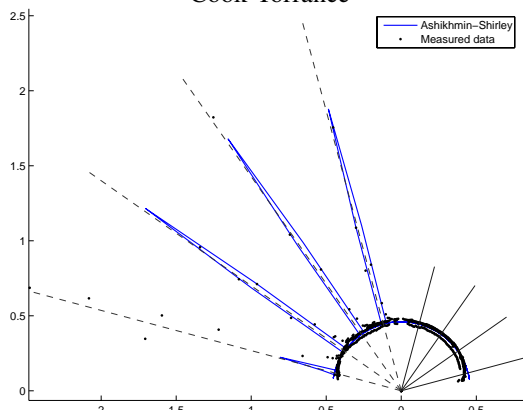
Ward-Duer



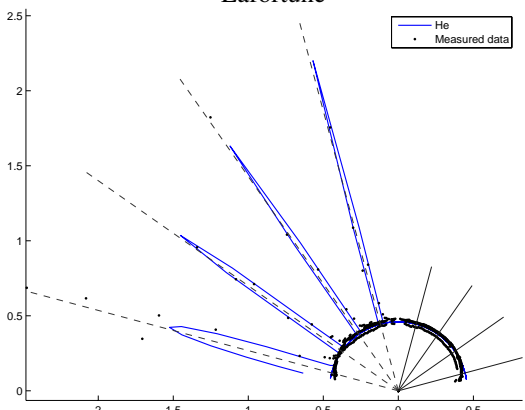
Cook-Torrance



Lafortune



Ashikhmin-Shirley



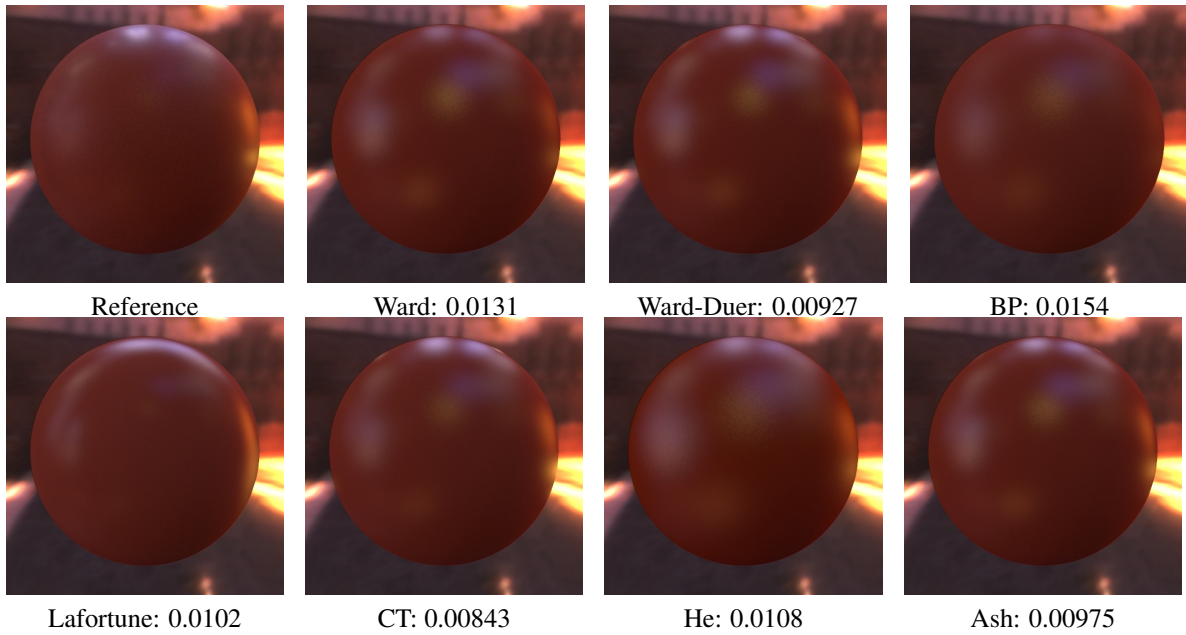
He

Material Name: red-french-wax

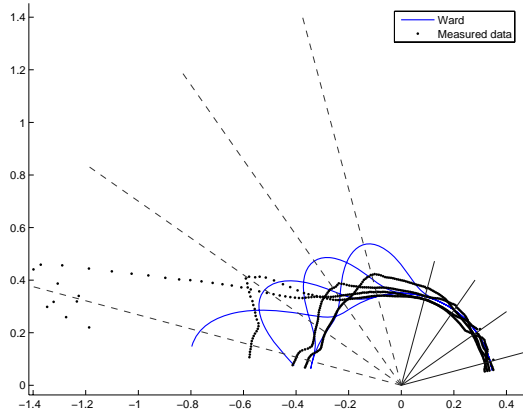
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.13	0.0158	0.00519	0.0288	0.0217	0.0147	0.138			0.0131
Ward-Duer	0.131	0.0156	0.00508	0.0192	0.015	0.0101	0.129			0.00927
Blinn-Phong	0.132	0.0182	0.00668	0.00817	0.00571	0.00394	70.9			0.0154
Lafortune et al.	0.139	0.0221	0.0095	0.138	0.111	0.0745	-0.591	0.548	73.9	0.0102
Cook-Torrance	0.134	0.018	0.00669	0.0825	0.0655	0.0444	0.153	0.13		0.00843
He et al.	0.121	0.00816	0	0.0916	0.0702	0.0482	4.04	0.393	4.07	0.0108
Ashikhmin-Shirley	0.131	0.0155	0.00507	0.0235	0.0183	0.0123	0.886	116		0.00975

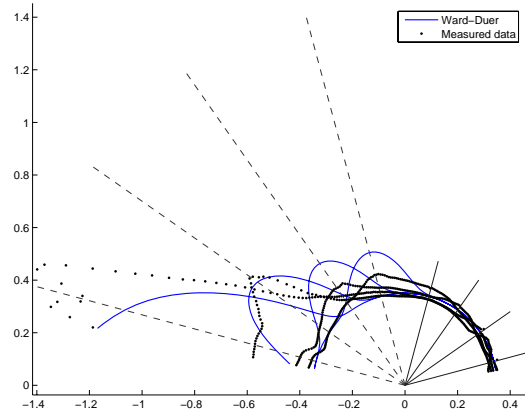
Rendered Images



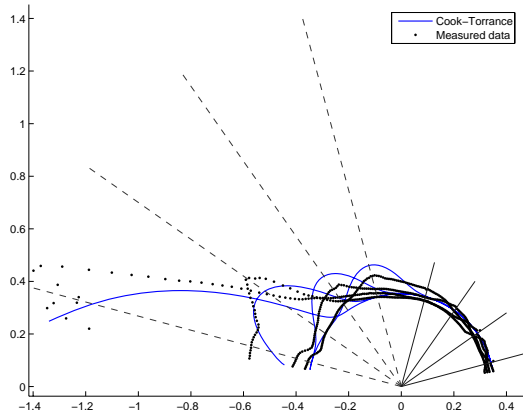
BRDF Plots in the incidence plane (Cubic root applied)



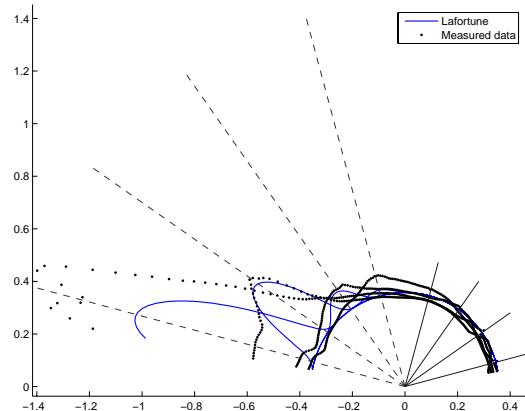
Ward



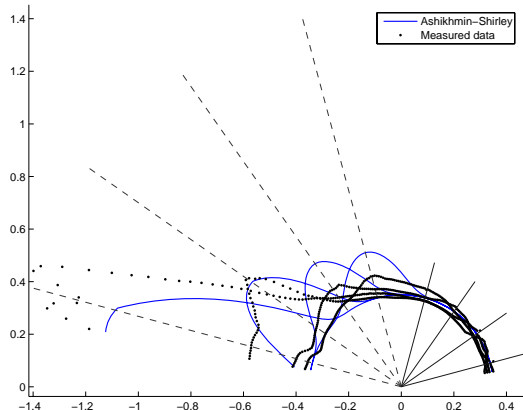
Ward-Duer



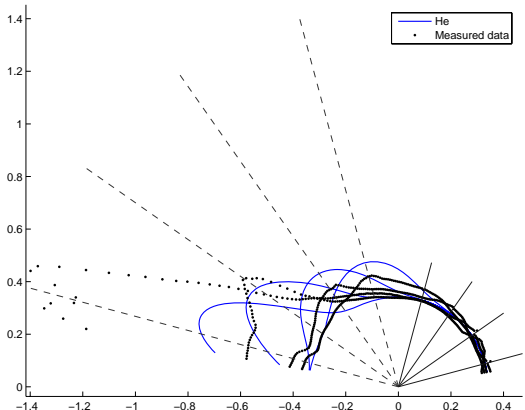
Cook-Torrance



Lafortune



Ashikhmin-Shirley



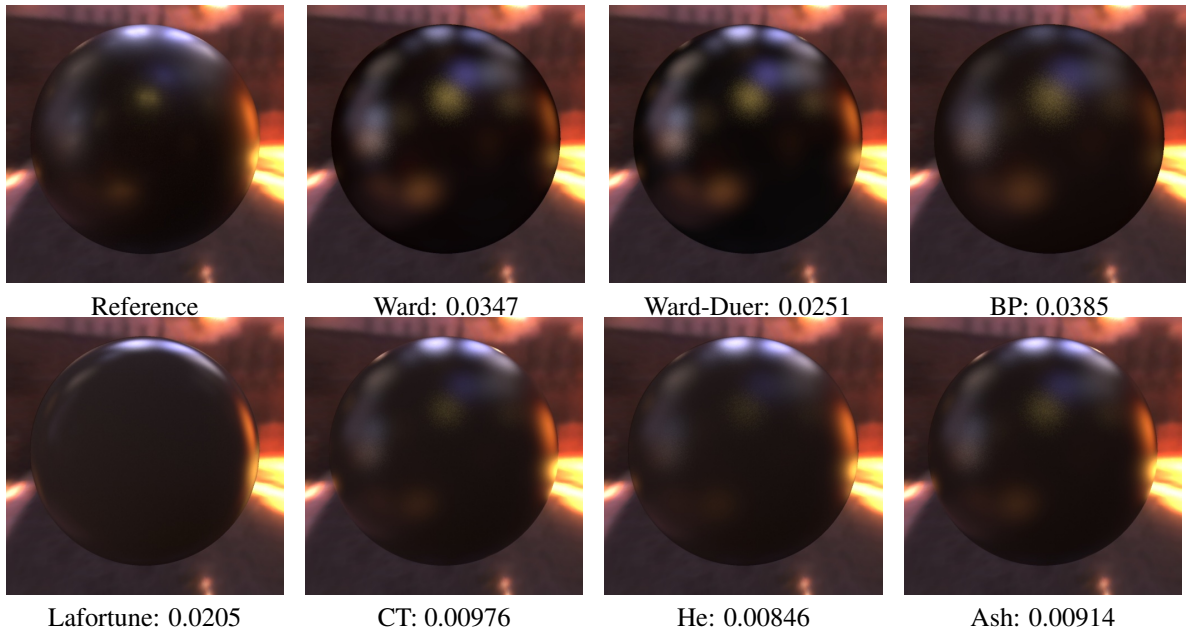
He

Material Name: red-oak-215

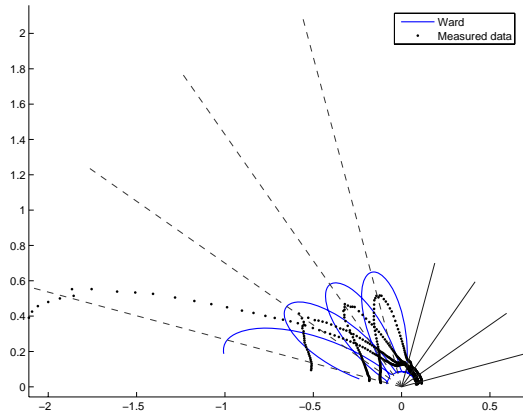
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.00185	0	0	0.0423	0.0364	0.025	0.108			0.0347
Ward-Duer	0	0	0	0.0334	0.0287	0.0196	0.105			0.0251
Blinn-Phong	0.00568	0.00249	0.00118	0.0117	0.0101	0.00699	103			0.0385
Lafortune et al.	0.0204	0.0152	0.01	0.617	0.53	0.361	-0.594	0.543	172	0.0205
Cook-Torrance	0.0114	0.00753	0.00474	0.327	0.28	0.192	0.0248	0.116		0.00976
He et al.	0.0121	0.0081	0.00514	0.771	0.662	0.453	8.02	0.533	1.19	0.00846
Ashikhmin-Shirley	0.00889	0.00537	0.00328	0.373	0.32	0.219	0.0383	124		0.00914

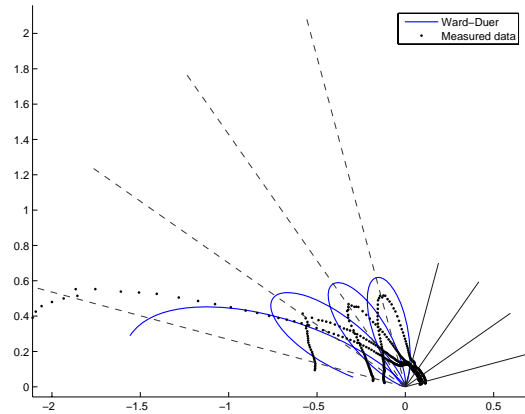
Rendered Images



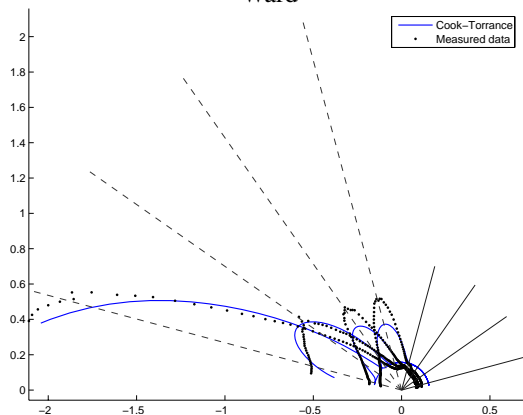
BRDF Plots in the incidence plane (Cubic root applied)



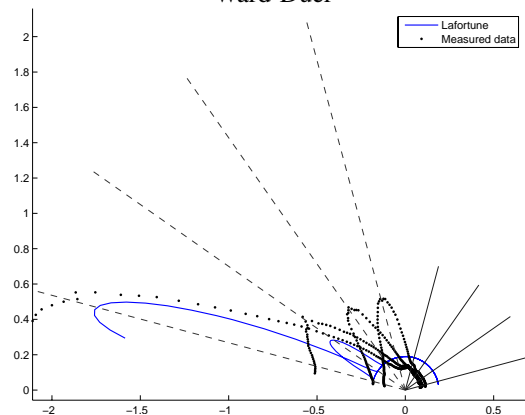
Ward



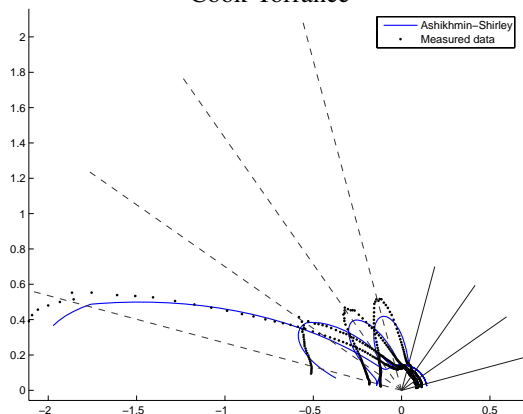
Ward-Duer



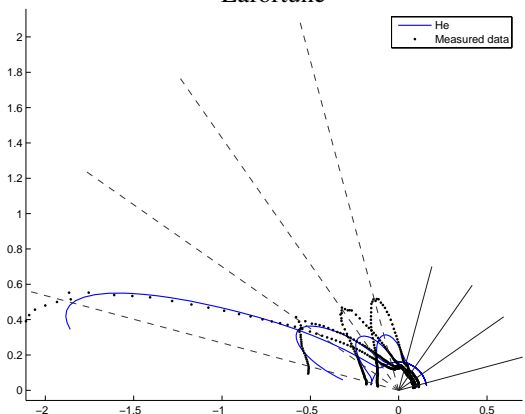
Cook-Torrance



Lafortune



Ashikhmin-Shirley



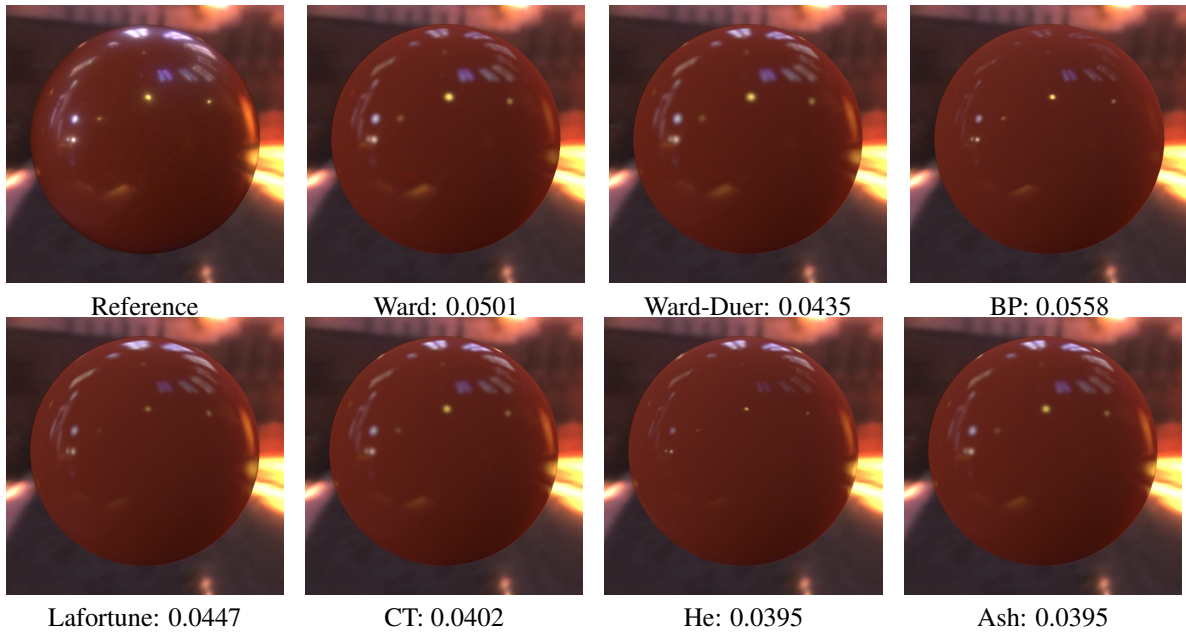
He

Material Name: red-phenolic

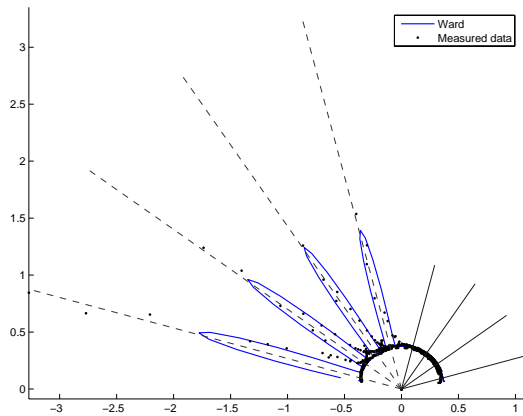
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.164	0.0215	0.00606	0.0169	0.0144	0.0089	0.0217			0.0501
Ward-Duer	0.164	0.0212	0.00593	0.0115	0.0104	0.00629	0.0232			0.0435
Blinn-Phong	0.167	0.0245	0.00789	0.00239	0.00185	0.00117	1.53e+004			0.0558
Lafortune et al.	0.167	0.0238	0.00753	0.0865	0.0806	0.0486	-0.578	0.576	2.09e+003	0.0447
Cook-Torrance	0.165	0.0226	0.0068	0.053	0.0487	0.0297	0.12	0.0212		0.0402
He et al.	0.168	0.0247	0.0081	7.47e+003	6.77e+003	4.11e+003	28	0.01	1.01	0.0395
Ashikhmin-Shirley	0.165	0.0227	0.00682	0.0566	0.0518	0.0317	0.12	4.55e+003		0.0395

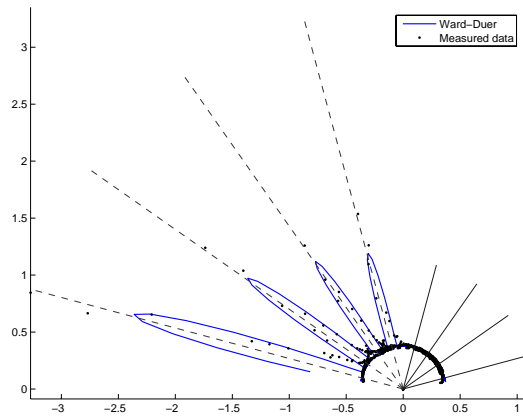
Rendered Images



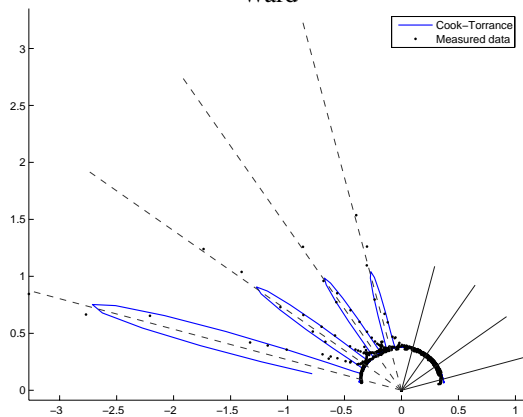
BRDF Plots in the incidence plane (Cubic root applied)



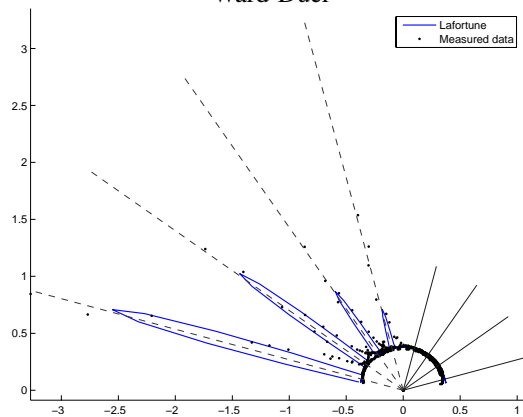
Ward



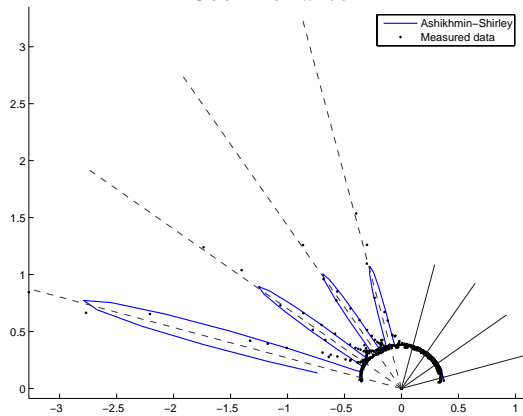
Ward-Duer



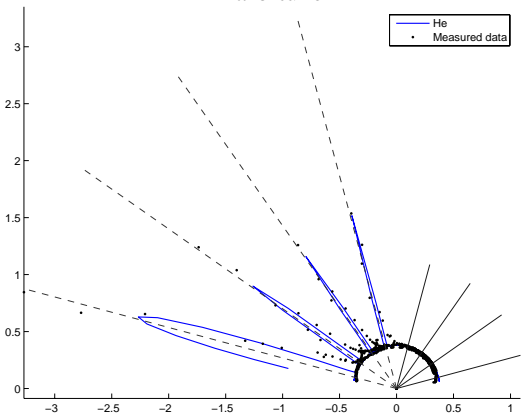
Cook-Torrance



Lafortune



Ashikhmin-Shirley



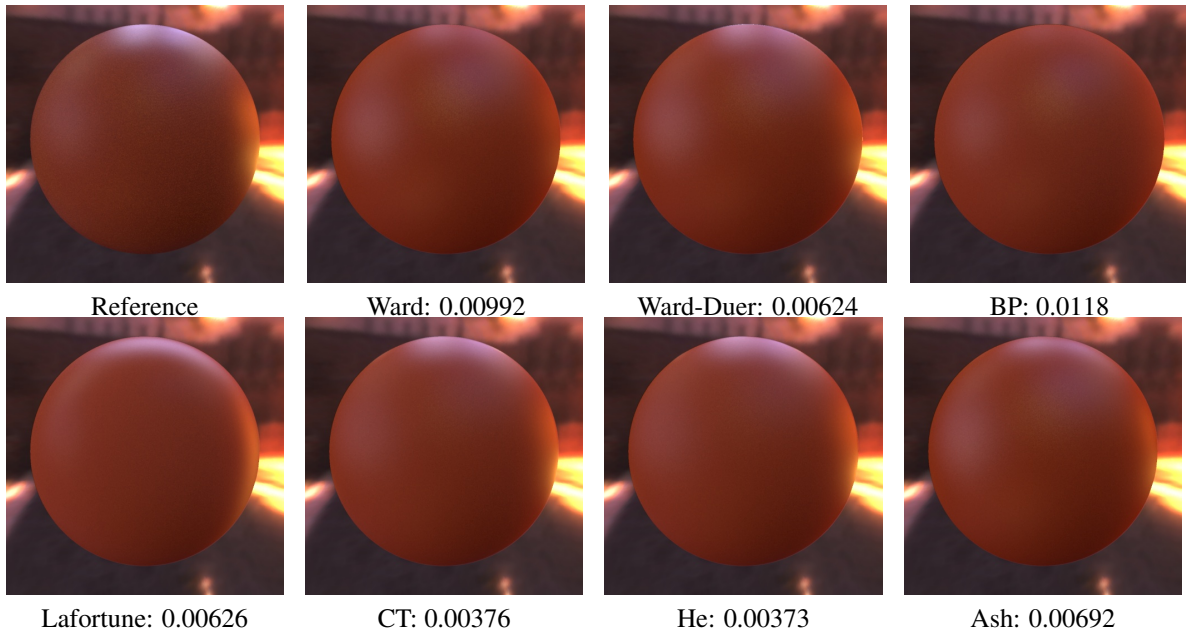
He

Material Name: red-plastic

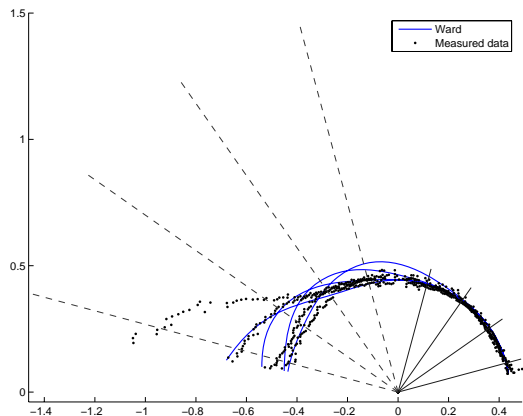
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.267	0.0384	0.00604	0.0433	0.0349	0.0241	0.25			0.00992
Ward-Duer	0.264	0.0366	0.00492	0.0324	0.0257	0.0176	0.252			0.00624
Blinn-Phong	0.276	0.0456	0.0109	0.00801	0.00662	0.00463	40.2			0.0118
Lafortune et al.	0.28	0.0496	0.0139	0.25	0.198	0.134	-0.63	0.453	23.2	0.00626
Cook-Torrance	0.271	0.0419	0.00855	0.193	0.153	0.105	0.085	0.262		0.00376
He et al.	0.269	0.0411	0.008	0.419	0.331	0.226	28	4.01	1.53	0.00373
Ashikhmin-Shirley	0.263	0.0354	0.00405	0.042	0.0336	0.0231	0.908	27.9		0.00692

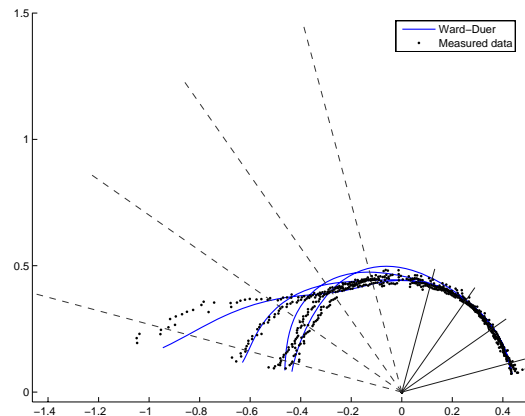
Rendered Images



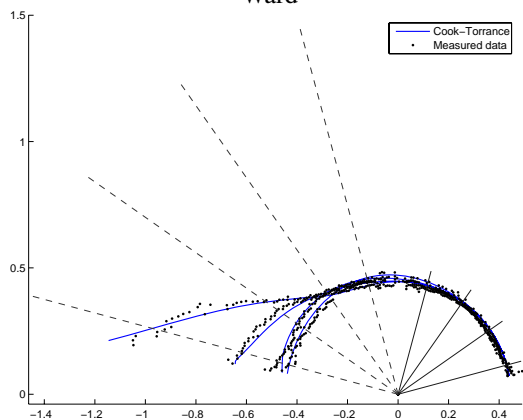
BRDF Plots in the incidence plane (Cubic root applied)



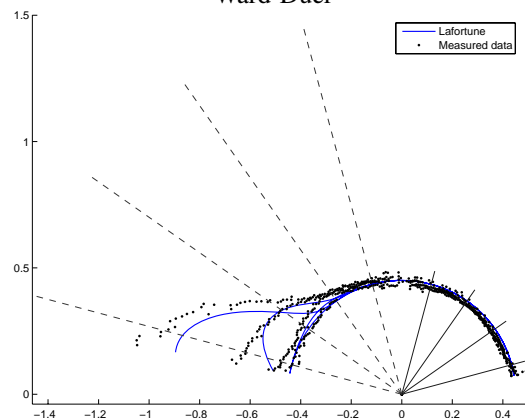
Ward



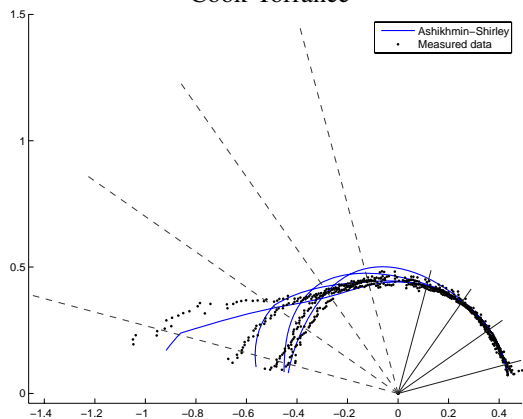
Ward-Duer



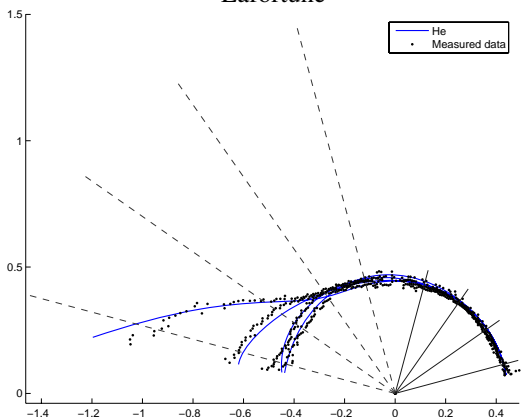
Cook-Torrance



Lafortune



Ashikhmin-Shirley



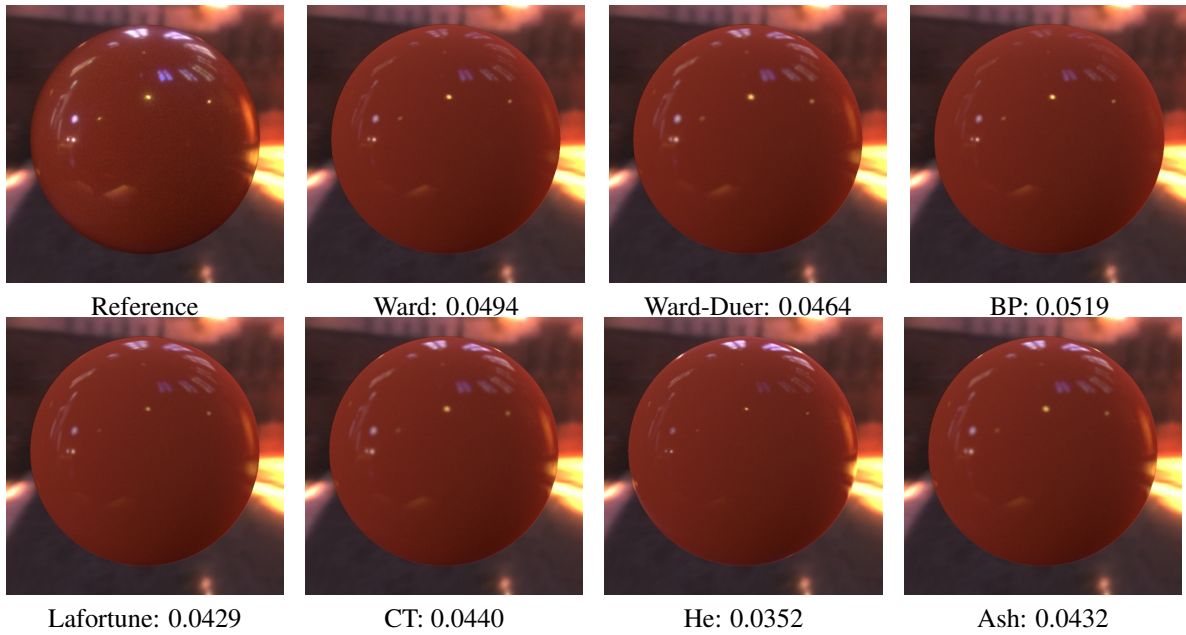
He

Material Name: red-plastic-specular

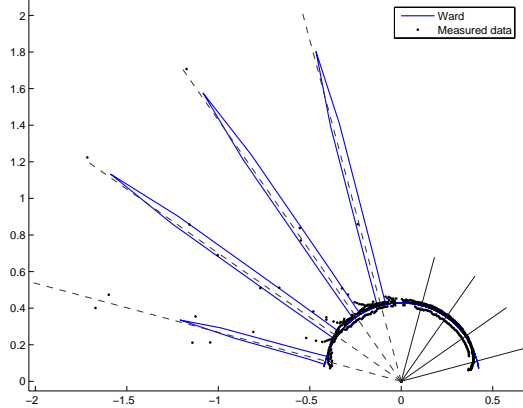
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.242	0.0312	0.00926	0.00786	0.00536	0.00337	0.0099			0.0494
Ward-Duer	0.241	0.0303	0.00864	0.00741	0.00556	0.0035	0.0146			0.0464
Blinn-Phong	0.242	0.0316	0.00946	0.00237	0.00156	0.000996	2e+004			0.0519
Lafortune et al.	0.243	0.0315	0.00936	0.0412	0.0317	0.0205	-0.577	0.577	5.59e+003	0.0429
Cook-Torrance	0.242	0.0307	0.00885	0.0496	0.0384	0.0252	0.0978	0.0157		0.044
He et al.	0.244	0.0322	0.00972	2.05e+005	1.49e+005	1.05e+005	50	0.0706	1	0.0352
Ashikhmin-Shirley	0.242	0.0307	0.00882	0.0583	0.0452	0.03	0.0898	8.32e+003		0.0432

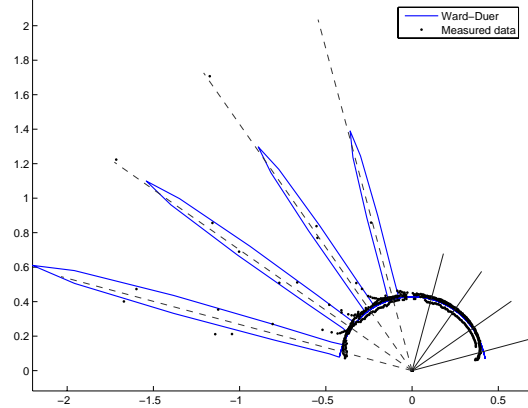
Rendered Images



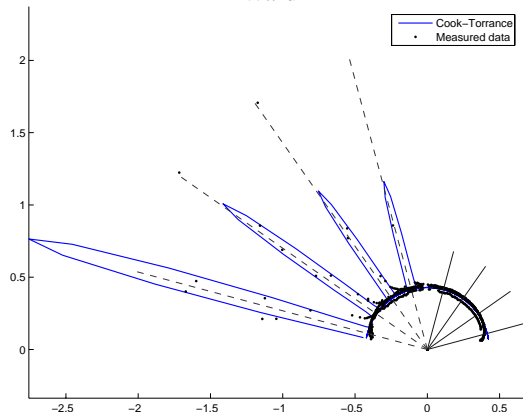
BRDF Plots in the incidence plane (Cubic root applied)



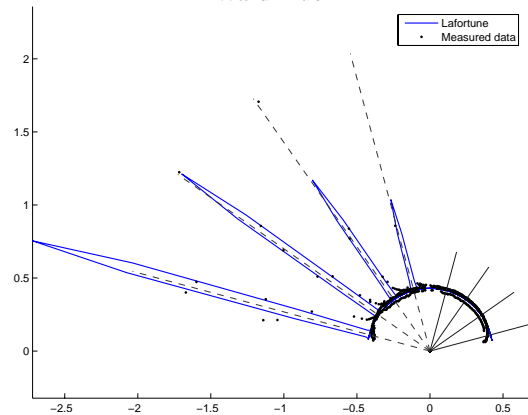
Ward



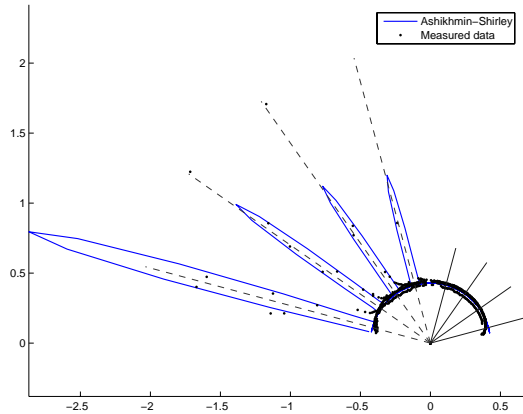
Ward-Duer



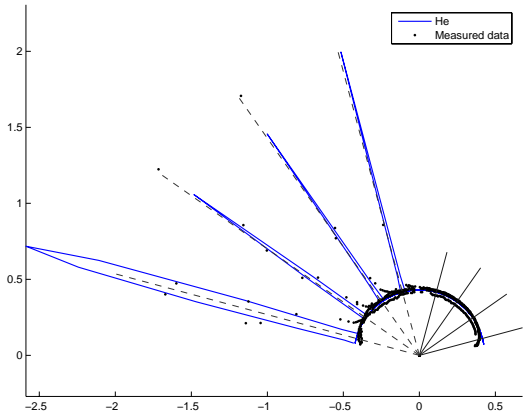
Cook-Torrance



Lafortune



Ashikhmin-Shirley



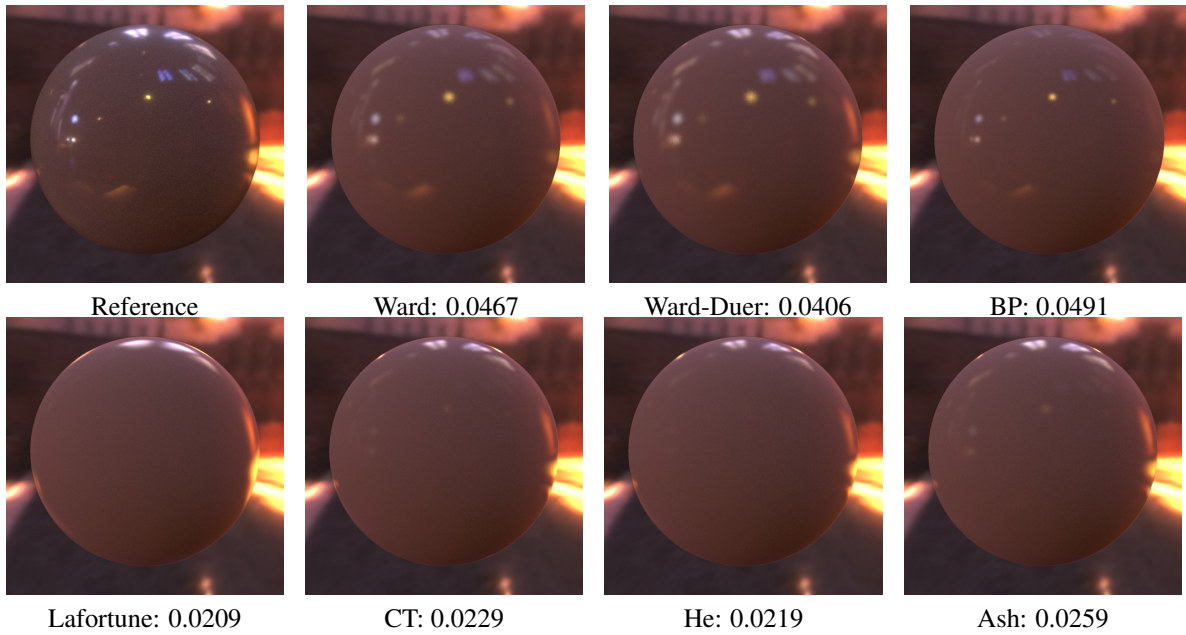
He

Material Name: rose-quartz

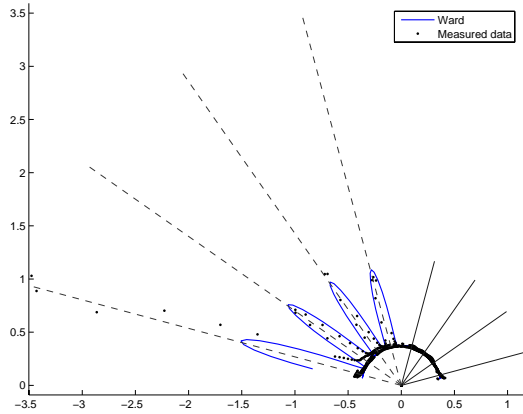
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.157	0.0818	0.0525	0.0158	0.0116	0.00669	0.0308			0.0467
Ward-Duer	0.155	0.0804	0.052	0.0147	0.0108	0.00557	0.0351			0.0406
Blinn-Phong	0.161	0.0841	0.0537	0.00241	0.00181	0.0011	4.97e+003			0.0491
Lafortune et al.	0.162	0.0856	0.0547	3.75	2.34	1.1	-0.588	0.555	622	0.0209
Cook-Torrance	0.161	0.085	0.0544	0.558	0.36	0.17	0.001	0.0302		0.0229
He et al.	0.162	0.0853	0.0546	29.1	18.1	8.66	28	0.467	1.01	0.0219
Ashikhmin-Shirley	0.161	0.0844	0.0542	0.161	0.111	0.0513	0.0092	1.7e+003		0.0259

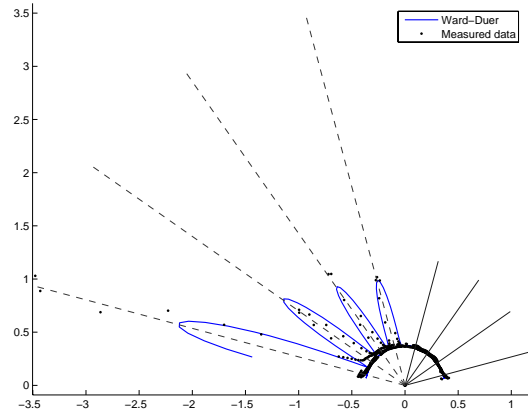
Rendered Images



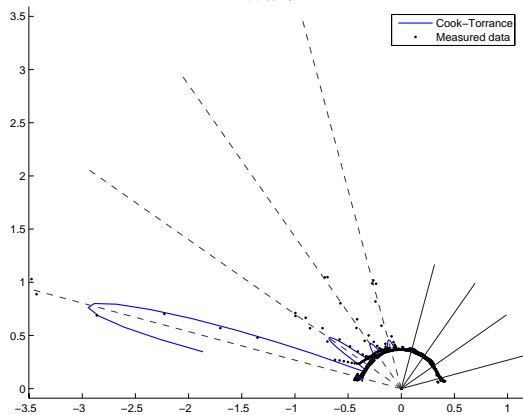
BRDF Plots in the incidence plane (Cubic root applied)



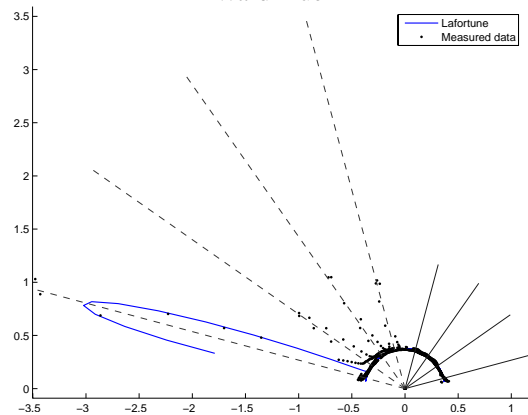
Ward



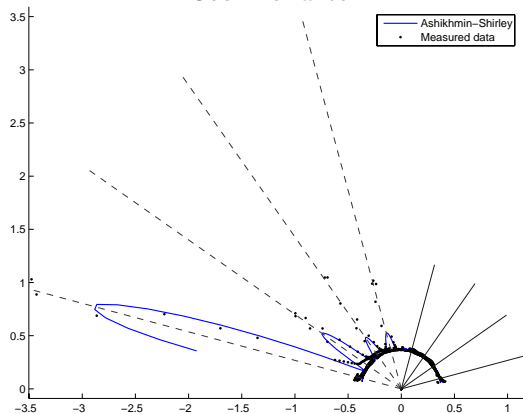
Ward-Duer



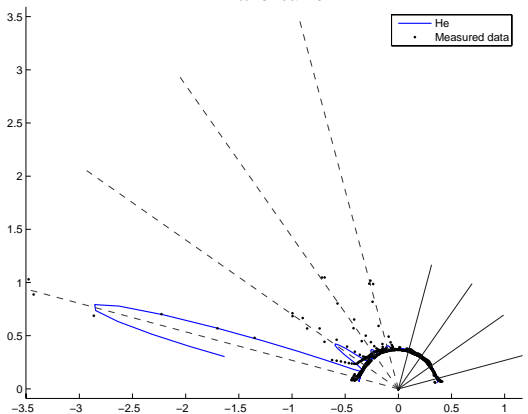
Cook-Torrance



Lafortune



Ashikhmin-Shirley



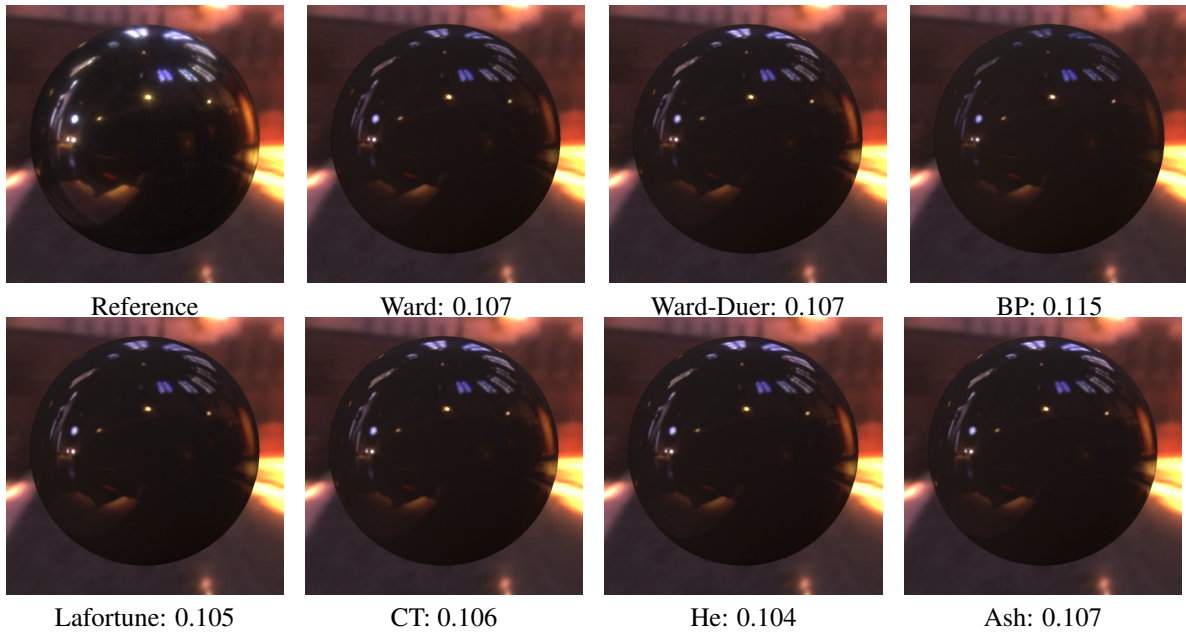
He

Material Name: silicon-nitride

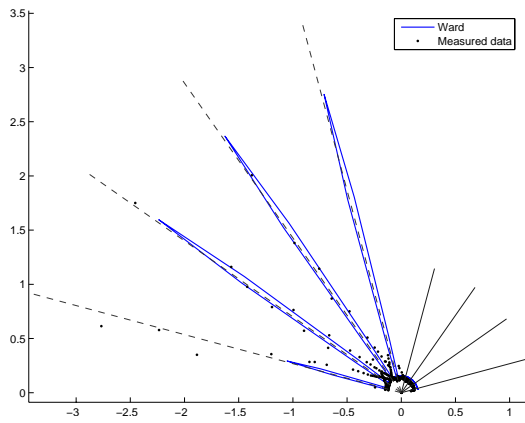
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.0113	0.00846	0.00485	0.0173	0.013	0.0115	0.00767			0.107
Ward-Duer	0.012	0.00908	0.00584	0.0119	0.00892	0.00739	0.007			0.107
Blinn-Phong	0.0146	0.011	0.00606	0.00394	0.00299	0.00319	5.17e+004			0.115
Lafortune et al.	0.0102	0.00823	0.0051	0.025	0.0176	0.0145	-0.577	0.577	9.44e+003	0.105
Cook-Torrance	0.0119	0.00894	0.00572	0.0234	0.0175	0.0145	0.526	0.00712		0.106
He et al.	0.0114	0.00864	0.00544	0.0447	0.0332	0.0276	90.9	0.334	3.25	0.104
Ashikhmin-Shirley	0.0121	0.00914	0.0059	0.0253	0.0189	0.0157	0.464	4.13e+004		0.107

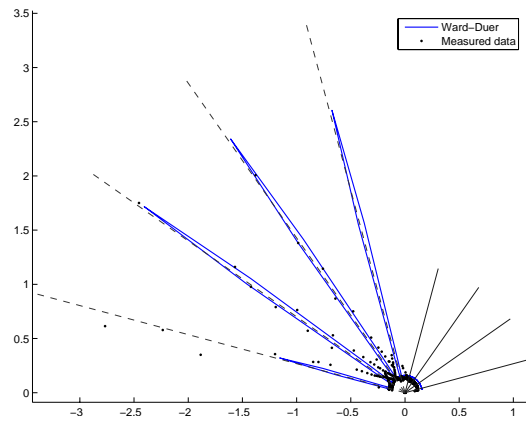
Rendered Images



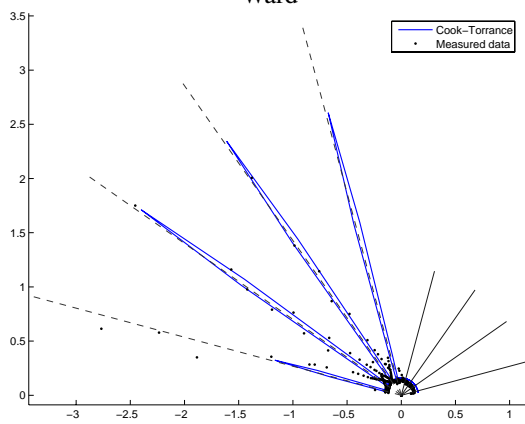
BRDF Plots in the incidence plane (Cubic root applied)



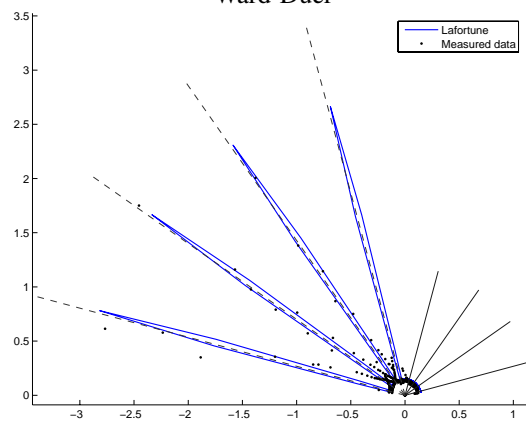
Ward



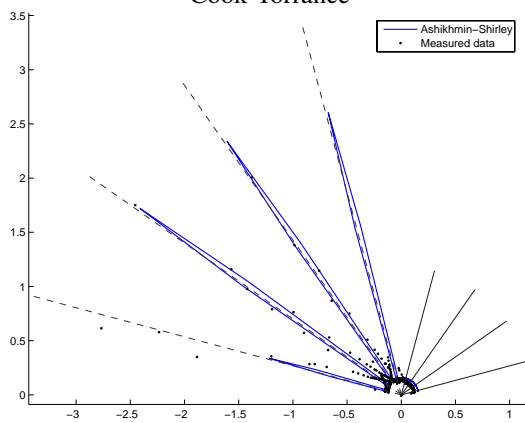
Ward-Duer



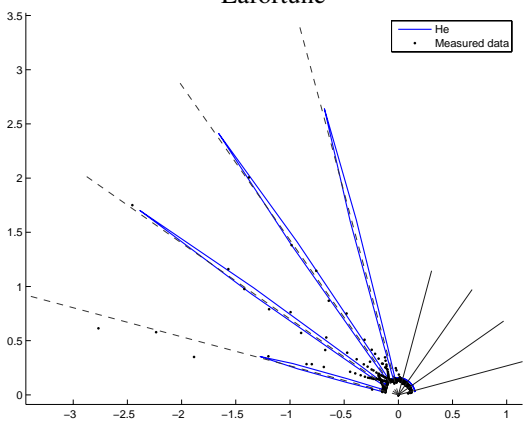
Cook-Torrance



Lafortune



Ashikhmin-Shirley



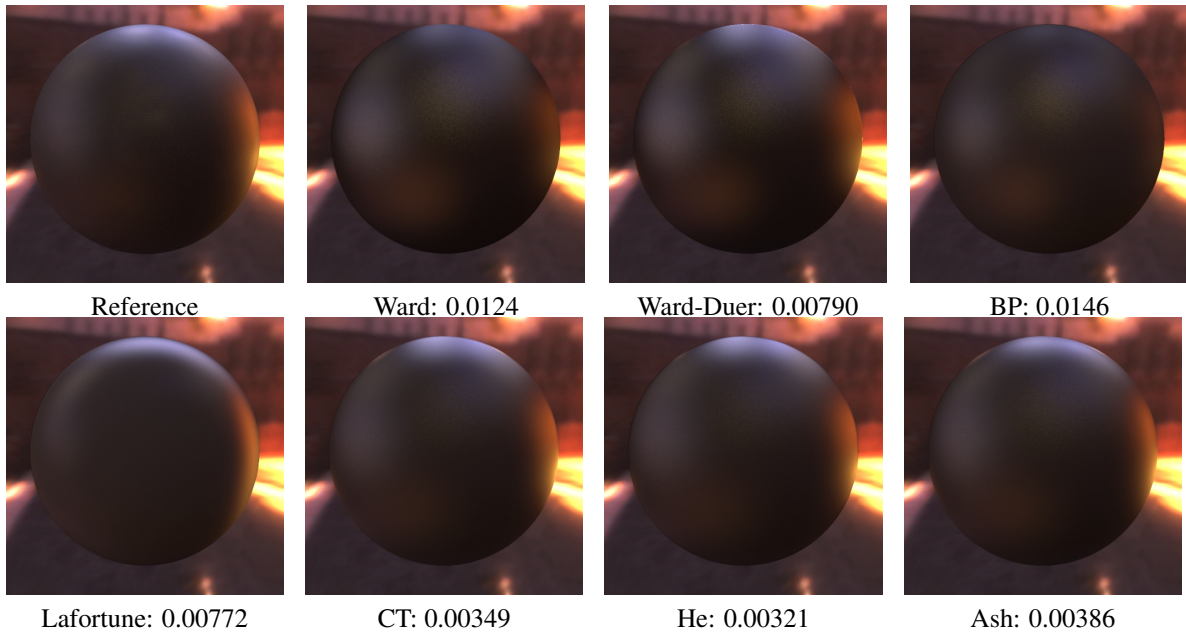
He

Material Name: special-walnut-224

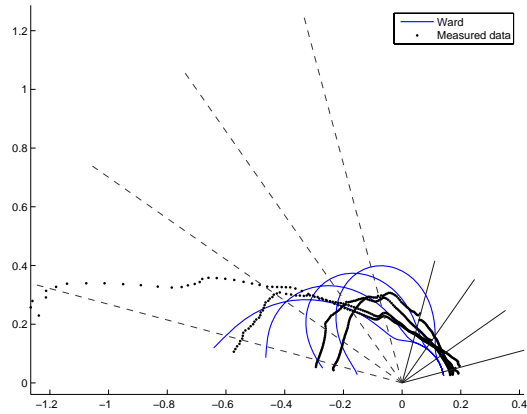
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.00877	0.00559	0.00337	0.0599	0.0516	0.0352	0.278			0.0124
Ward-Duer	0.00859	0.00564	0.00356	0.0399	0.0341	0.023	0.257			0.0079
Blinn-Phong	0.021	0.0162	0.0106	0.011	0.00946	0.00645	34.4			0.0146
Lafortune et al.	0.0308	0.0247	0.0165	0.323	0.275	0.184	-0.629	0.456	27.9	0.00772
Cook-Torrance	0.0187	0.0145	0.00961	0.252	0.214	0.143	0.0688	0.258		0.00349
He et al.	0.0172	0.0132	0.00875	0.46	0.39	0.262	7.98	1.08	1.53	0.00321
Ashikhmin-Shirley	0.0149	0.0113	0.00752	0.373	0.316	0.211	0.0833	22.5		0.00386

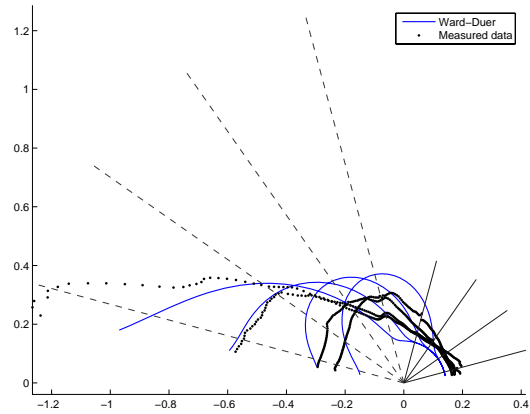
Rendered Images



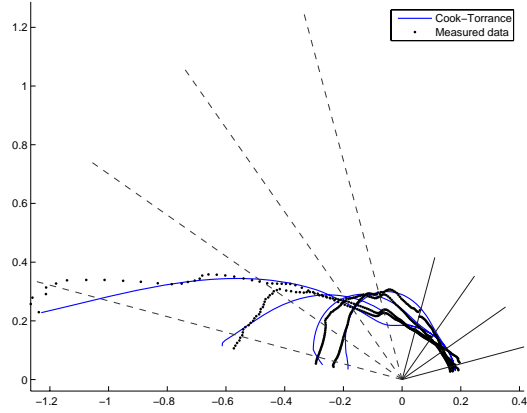
BRDF Plots in the incidence plane (Cubic root applied)



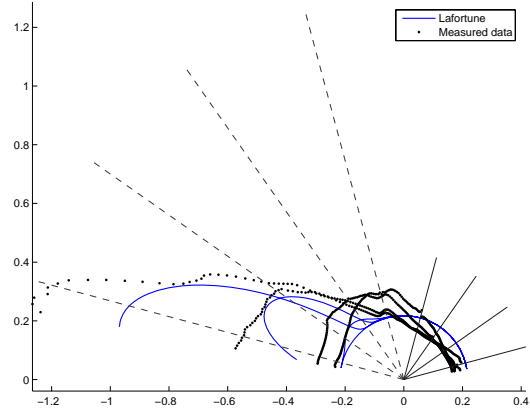
Ward



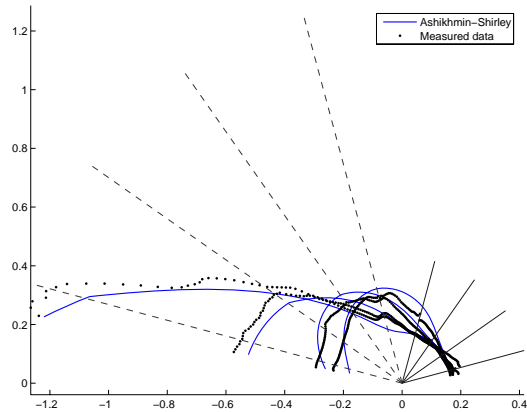
Ward-Duer



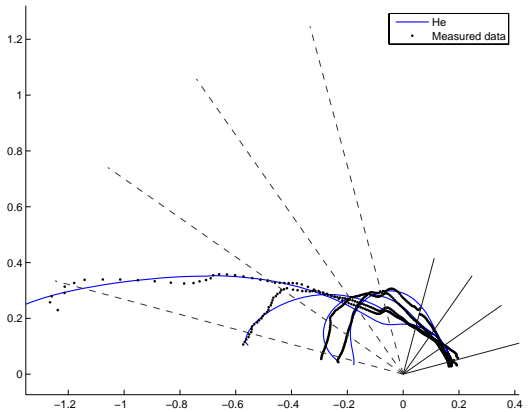
Cook-Torrance



Lafortune



Ashikhmin-Shirley



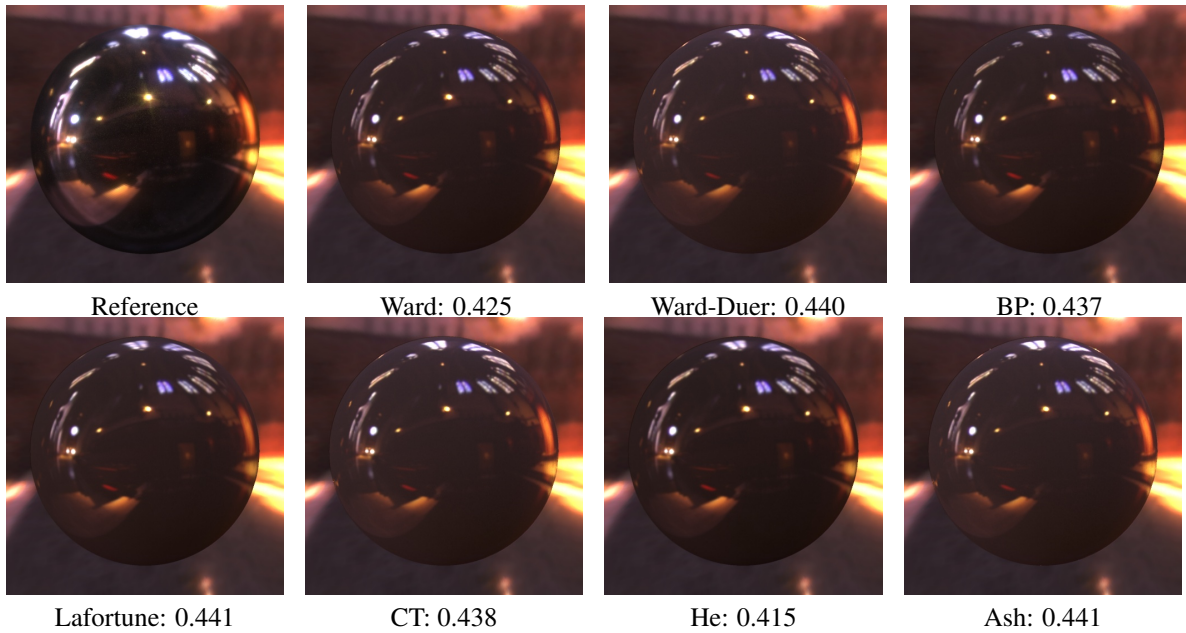
He

Material Name: ss440

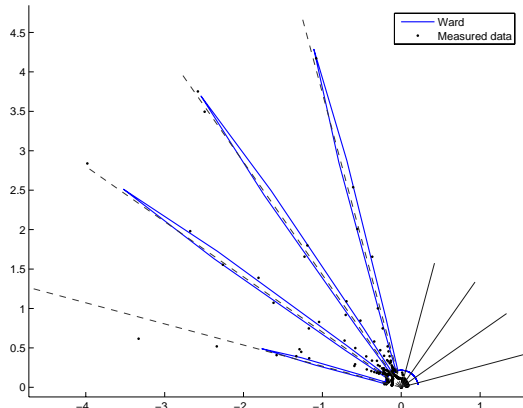
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.0305	0.0187	0.0137	0.0701	0.049	0.0282	0.00789			0.425
Ward-Duer	0.0404	0.0257	0.019	0.0456	0.0321	0.0178	0.00709			0.44
Blinn-Phong	0.0303	0.0187	0.0122	0.0232	0.0161	0.00974	2.99e+004			0.437
Lafortune et al.	0.0294	0.0181	0.0122	0.0747	0.052	0.0309	-0.577	0.577	9.04e+003	0.441
Cook-Torrance	0.0386	0.0245	0.0182	0.0756	0.0532	0.0296	0.627	0.00724		0.438
He et al.	0.0216	0.0128	0.00831	0.429	0.296	0.177	30.7	0.12	2.44	0.415
Ashikhmin-Shirley	0.0405	0.0258	0.019	0.0457	0.0321	0.0179	0.999	3.96e+004		0.441

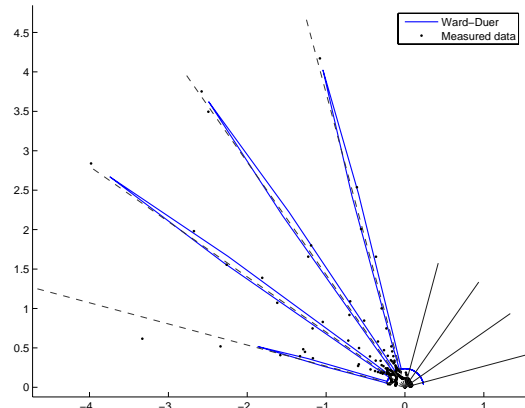
Rendered Images



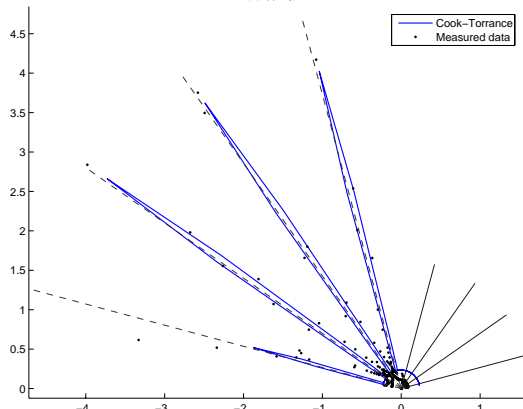
BRDF Plots in the incidence plane (Cubic root applied)



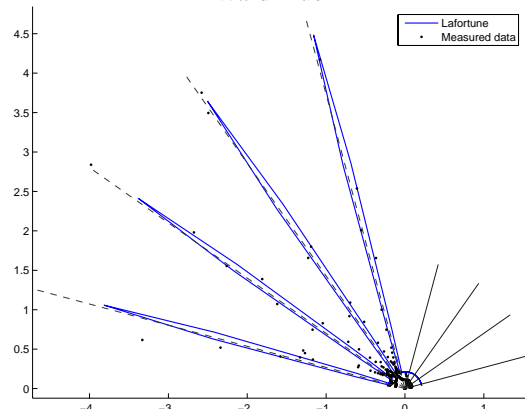
Ward



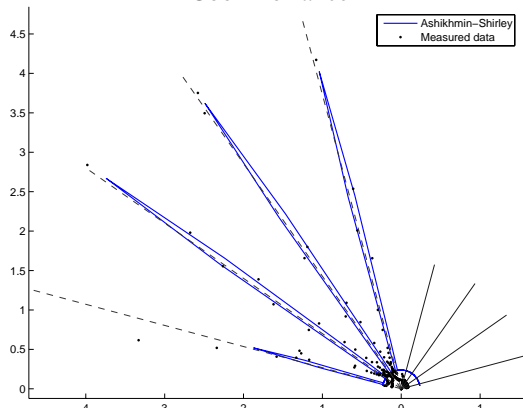
Ward-Duer



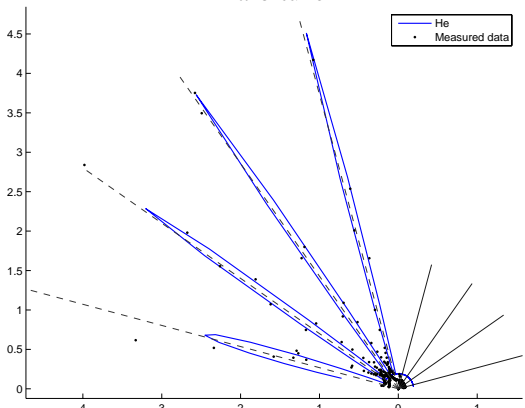
Cook-Torrance



Lafortune



Ashikhmin-Shirley



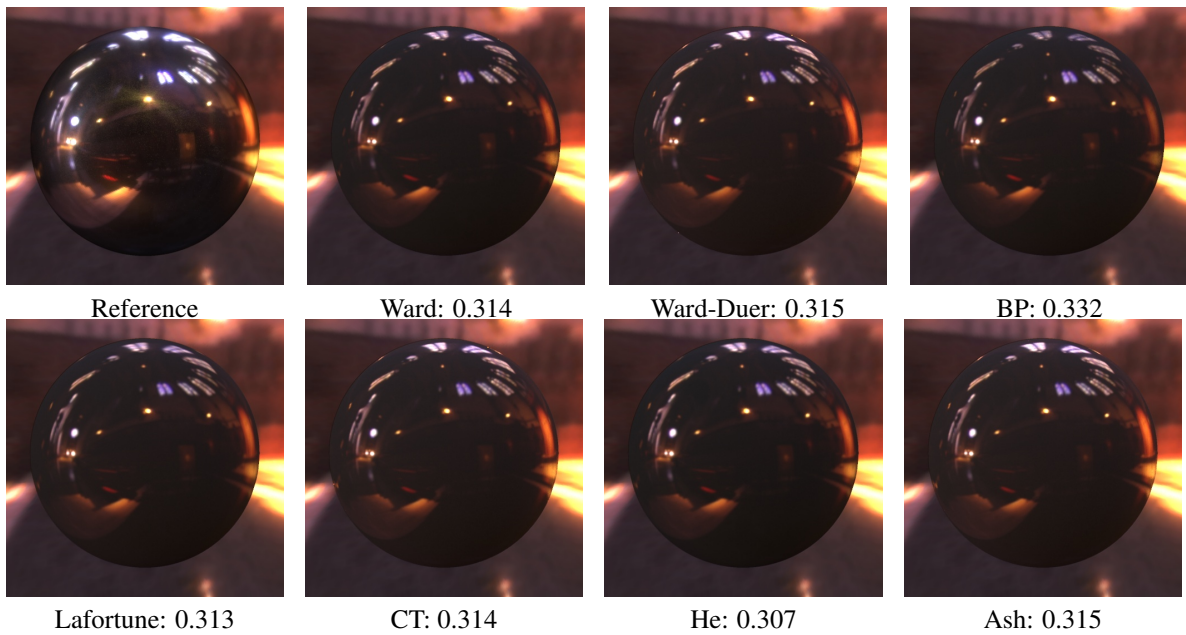
He

Material Name: steel

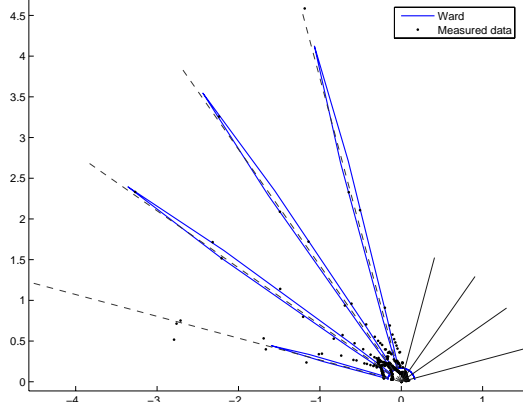
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.0142	0.015	0.0106	0.0595	0.0326	0.0177	0.0077			0.314
Ward-Duer	0.0194	0.018	0.0123	0.0403	0.0222	0.0121	0.00706			0.315
Blinn-Phong	0.0156	0.0162	0.0112	0.0189	0.0103	0.00561	3.22e+004			0.332
Lafortune et al.	0.0157	0.0154	0.0106	0.0644	0.0357	0.0196	-0.577	0.577	1.02e+004	0.313
Cook-Torrance	0.0188	0.0176	0.0121	0.0712	0.0392	0.0213	0.584	0.00714		0.314
He et al.	0.0122	0.0139	0.00969	0.189	0.103	0.0568	43.8	0.178	3.03	0.307
Ashikhmin-Shirley	0.0195	0.018	0.0123	0.0404	0.0222	0.0121	0.999	4.01e+004		0.315

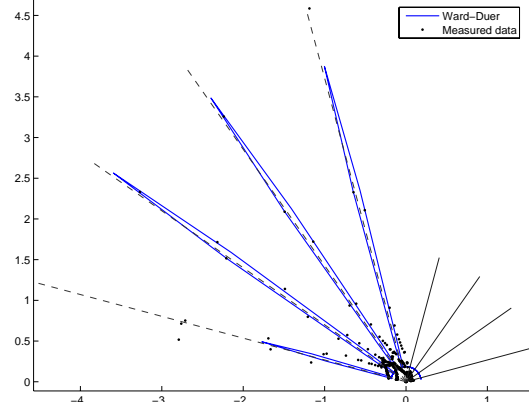
Rendered Images



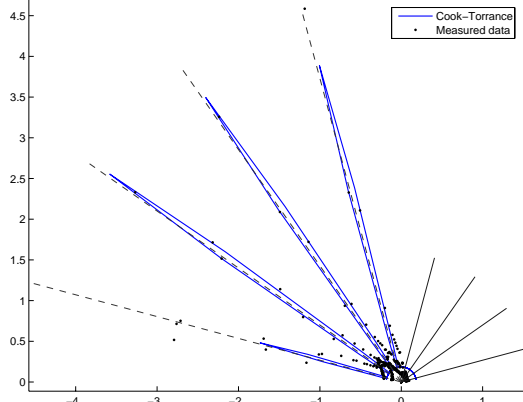
BRDF Plots in the incidence plane (Cubic root applied)



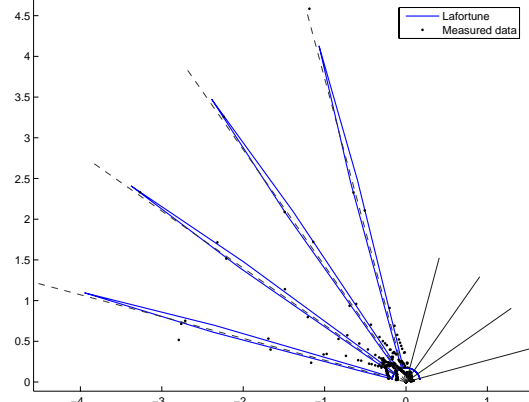
Ward



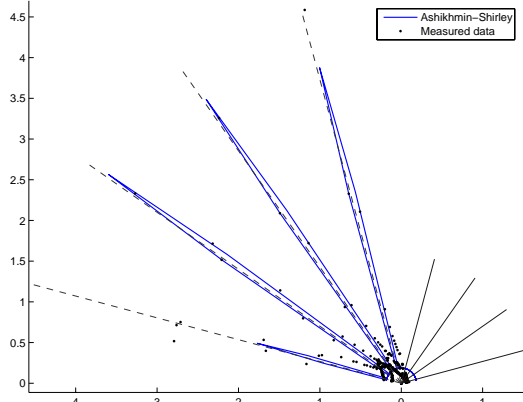
Ward-Duer



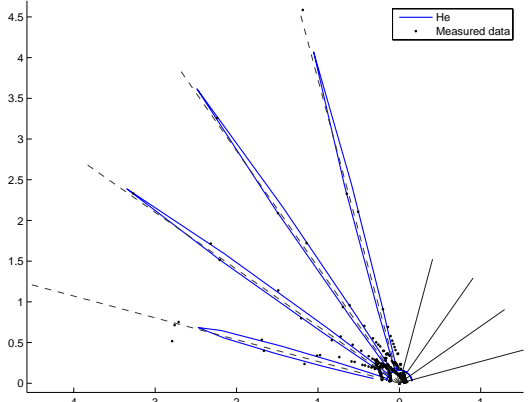
Cook-Torrance



Lafortune



Ashikhmin-Shirley



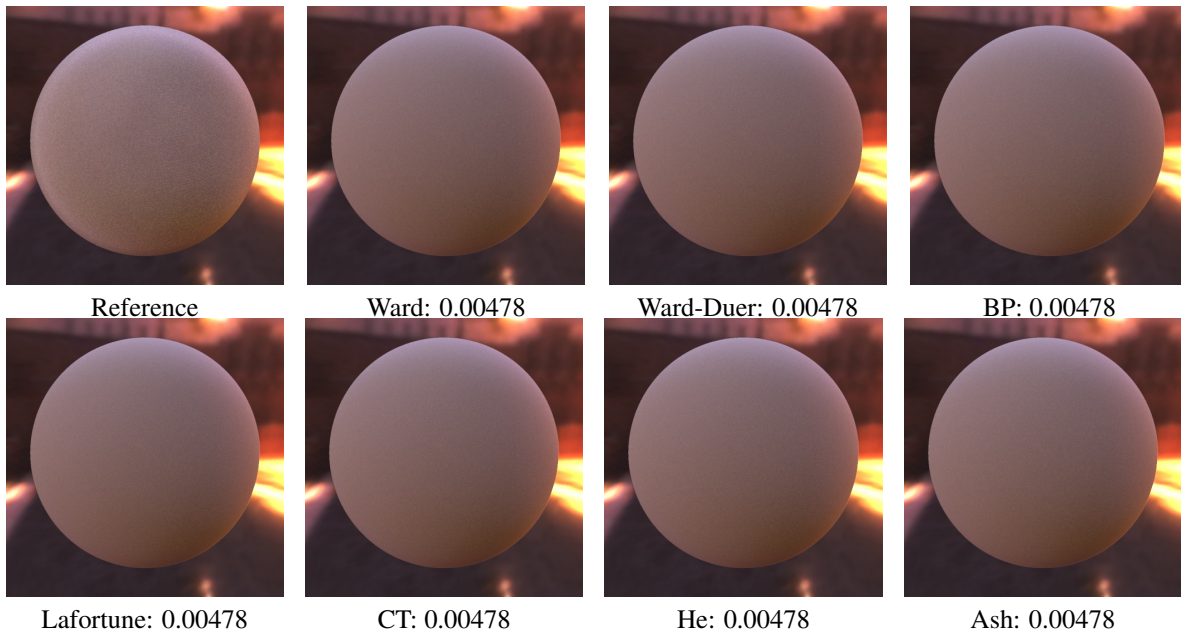
He

Material Name: sugar

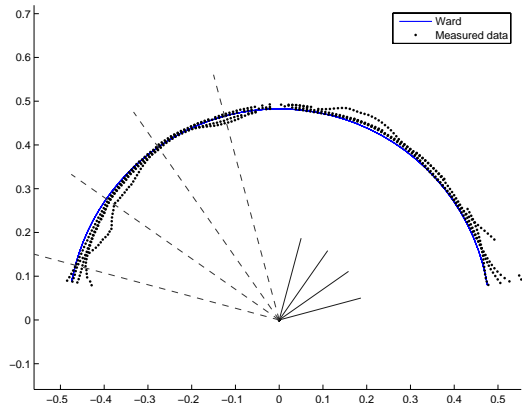
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.345	0.291	0.196	0	0	0	0.185			0.00478
Ward-Duer	0.345	0.291	0.196	0	0	0	0.185			0.00478
Blinn-Phong	0.345	0.291	0.196	0	0	0	1.01			0.00478
Lafortune et al.	0.345	0.291	0.196	0	0	0	-0.316	0.894	1.01	0.00478
Cook-Torrance	0.345	0.291	0.196	0	0	0	0.891	0.238		0.00478
He et al.	0.345	0.291	0.196	0	0	0	16	4.03	9.1	0.00478
Ashikhmin-Shirley	0.345	0.291	0.196	0	0	0	0.891	35.4		0.00478

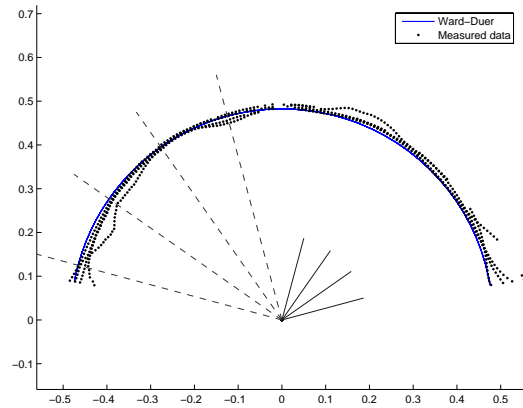
Rendered Images



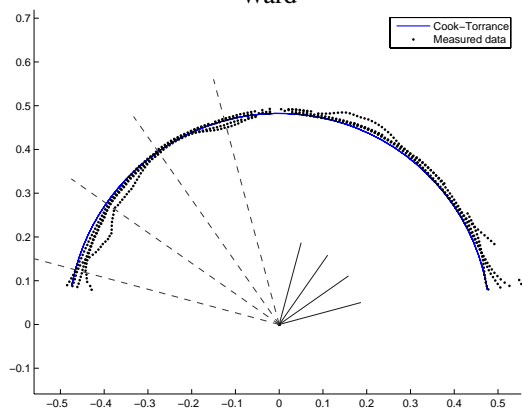
BRDF Plots in the incidence plane (Cubic root applied)



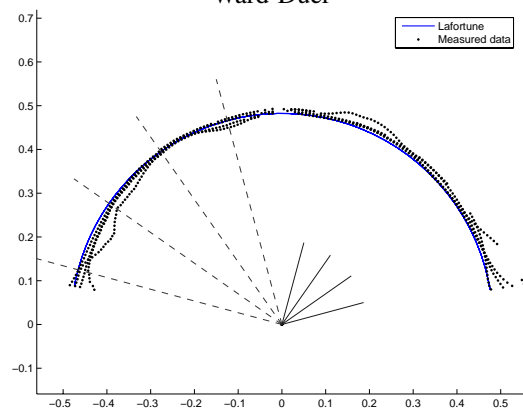
Ward



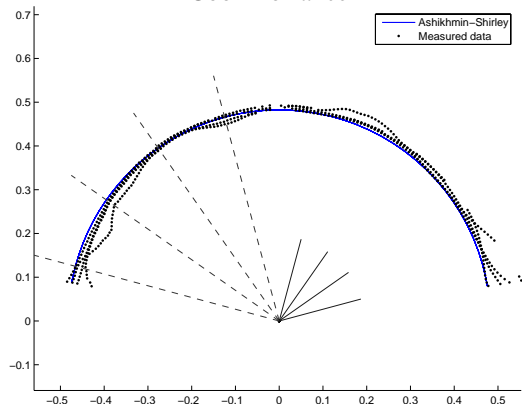
Ward-Duer



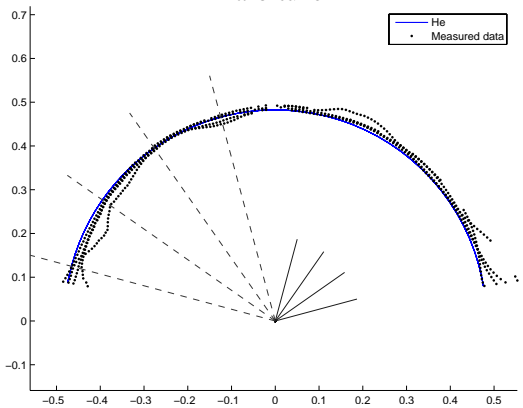
Cook-Torrance



Lafortune



Ashikhmin-Shirley



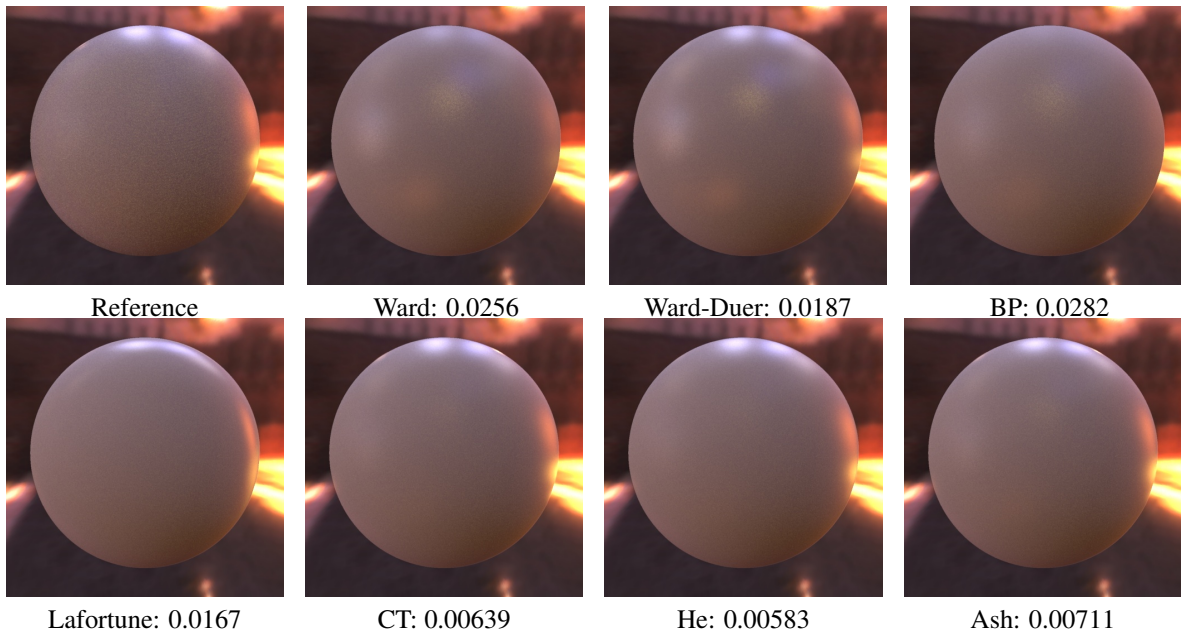
He

Material Name: teflon

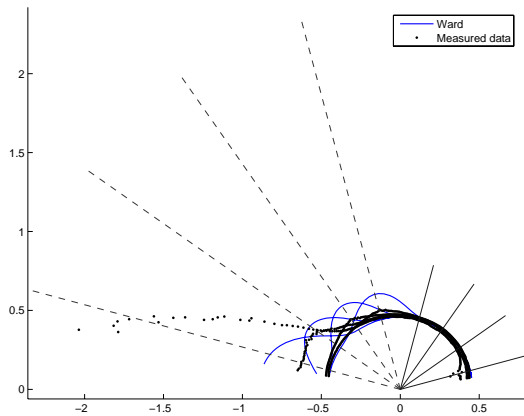
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.296	0.255	0.174	0.0436	0.0382	0.0268	0.158			0.0256
Ward-Duer	0.294	0.254	0.173	0.032	0.0277	0.0189	0.138			0.0187
Blinn-Phong	0.303	0.261	0.178	0.01	0.009	0.00649	63.1			0.0282
Lafortune et al.	0.316	0.273	0.186	0.503	0.432	0.289	-0.6	0.529	123	0.0167
Cook-Torrance	0.308	0.266	0.182	0.319	0.273	0.183	0.0203	0.139		0.00639
He et al.	0.307	0.265	0.181	0.638	0.546	0.365	8.01	0.643	1.22	0.00583
Ashikhmin-Shirley	0.306	0.264	0.181	0.345	0.296	0.197	0.0337	88.2		0.00711

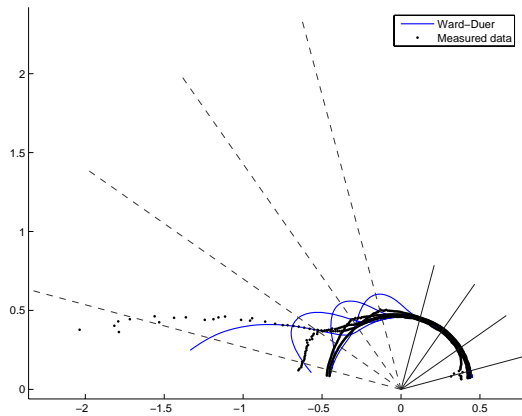
Rendered Images



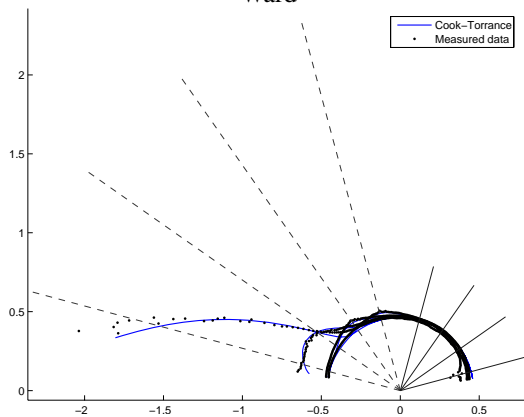
BRDF Plots in the incidence plane (Cubic root applied)



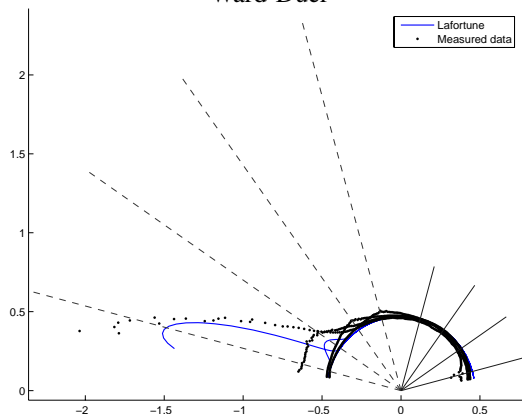
Ward



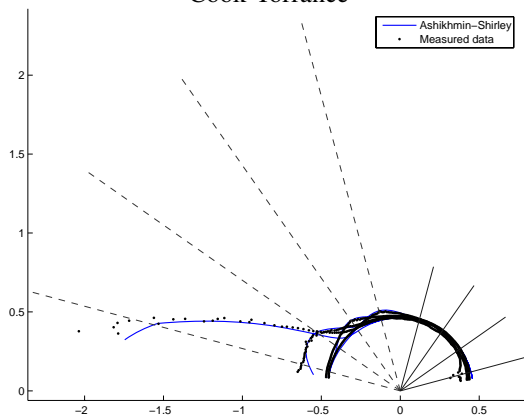
Ward-Duer



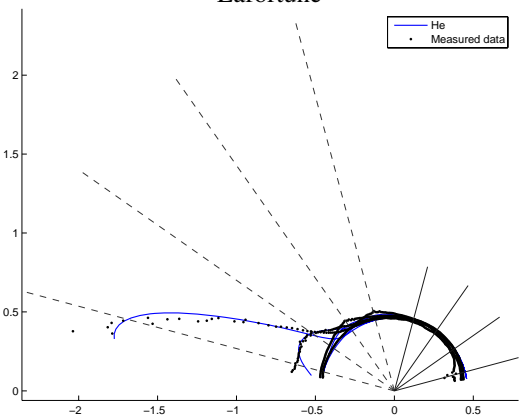
Cook-Torrance



Lafortune



Ashikhmin-Shirley



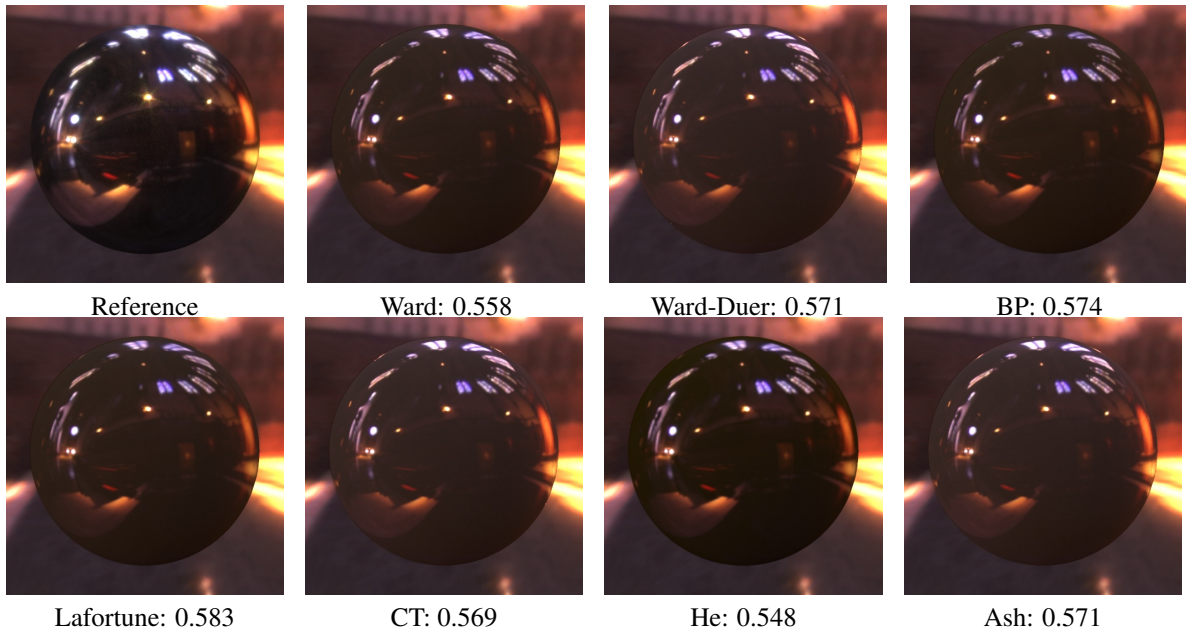
He

Material Name: tungsten-carbide

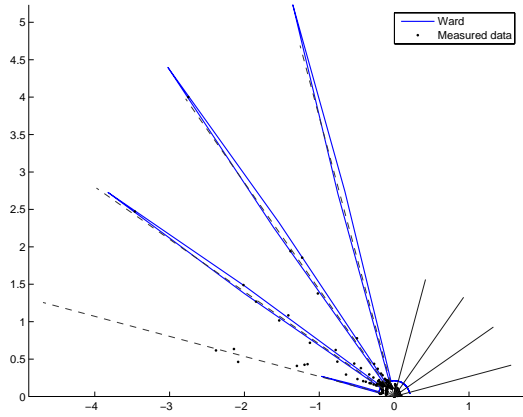
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.0288	0.0196	0.00761	0.0806	0.0466	0.0351	0.00621			0.558
Ward-Duer	0.0386	0.0261	0.0137	0.0555	0.0318	0.0237	0.00558			0.571
Blinn-Phong	0.026	0.0172	0.00442	0.0268	0.0157	0.012	4.58e+004			0.574
Lafortune et al.	0.0267	0.0178	0.00604	0.0849	0.0495	0.0373	-0.577	0.577	1.45e+004	0.583
Cook-Torrance	0.0385	0.026	0.0135	0.0902	0.0517	0.0386	0.625	0.00559		0.569
He et al.	0.0129	0.00872	0	0.292	0.171	0.128	38.3	0.123	3.45	0.548
Ashikhmin-Shirley	0.0401	0.0269	0.0143	0.0549	0.0315	0.0235	0.999	6.63e+004		0.571

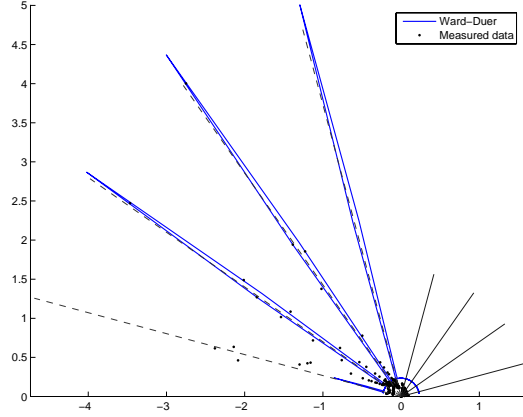
Rendered Images



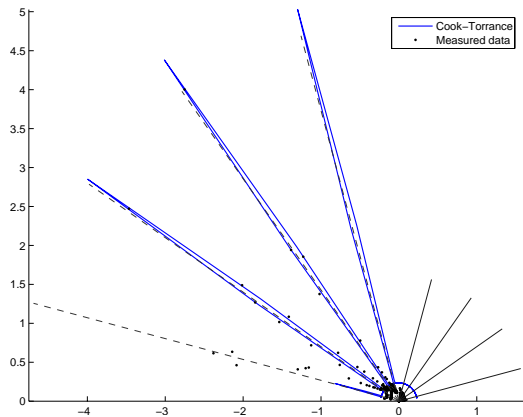
BRDF Plots in the incidence plane (Cubic root applied)



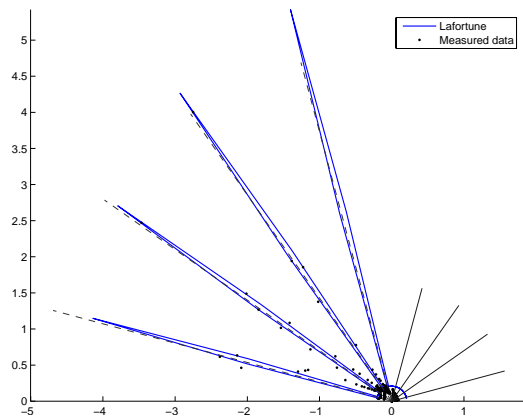
Ward



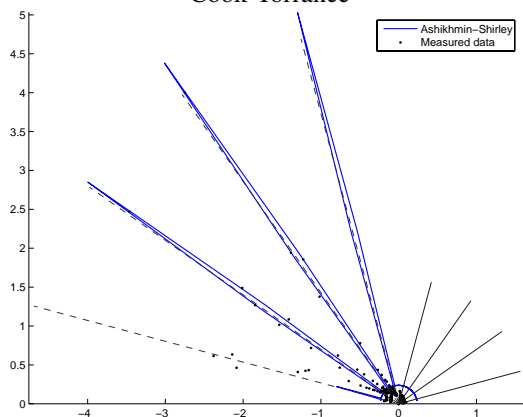
Ward-Duer



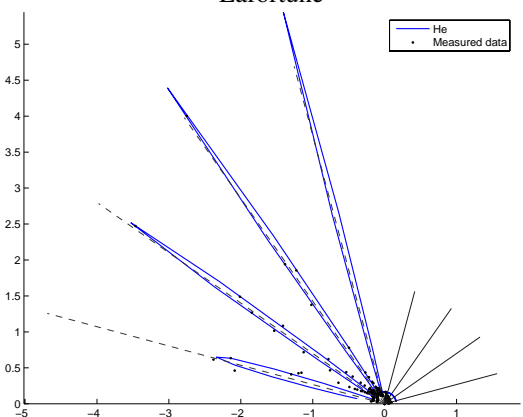
Cook-Torrance



Lafortune



Ashikhmin-Shirley



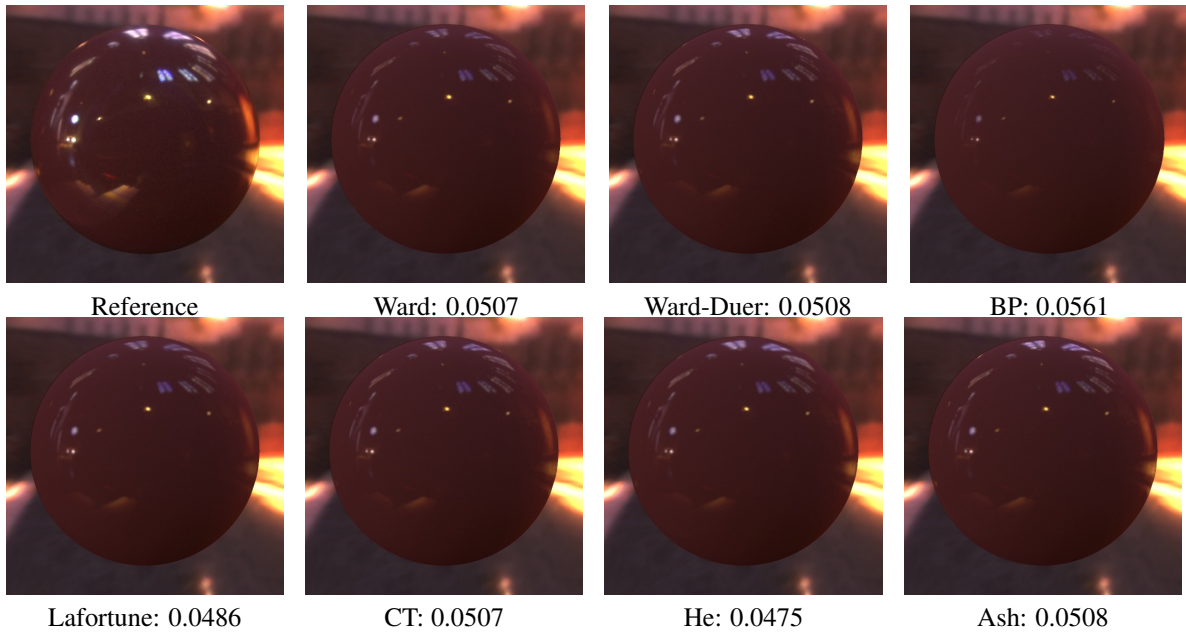
He

Material Name: violet-bball

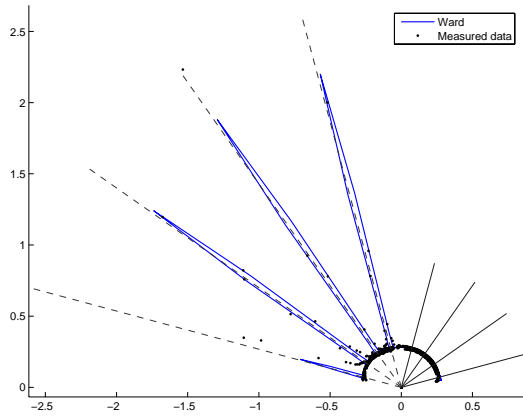
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.0686	0.0152	0.012	0.00774	0.00464	0.00326	0.00719			0.0507
Ward-Duer	0.0688	0.0153	0.012	0.00546	0.00333	0.0024	0.00691			0.0508
Blinn-Phong	0.0708	0.0167	0.013	0.00109	0.000602	0.000442	1.21e+005			0.0561
Lafortune et al.	0.0683	0.0149	0.0117	0.0106	0.00671	0.00478	-0.577	0.577	1.03e+004	0.0486
Cook-Torrance	0.0688	0.0154	0.012	0.0115	0.007	0.00502	0.477	0.0068		0.0507
He et al.	0.0682	0.0148	0.0117	2.41	1.54	1.1	30	0.0406	1.23	0.0475
Ashikhmin-Shirley	0.069	0.0154	0.0121	0.0244	0.0149	0.0108	0.211	4.56e+004		0.0508

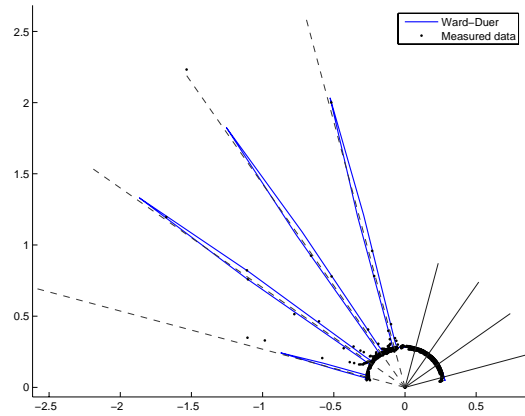
Rendered Images



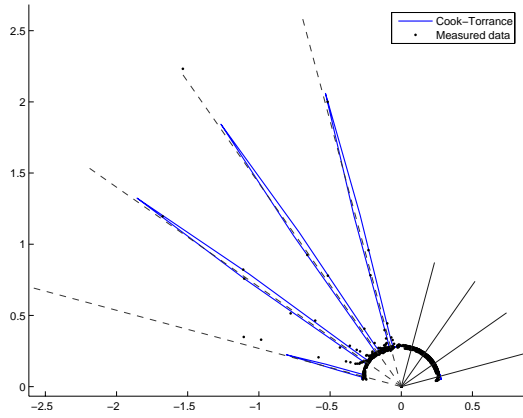
BRDF Plots in the incidence plane (Cubic root applied)



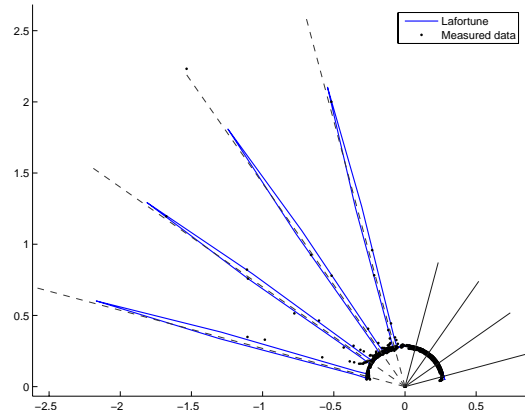
Ward



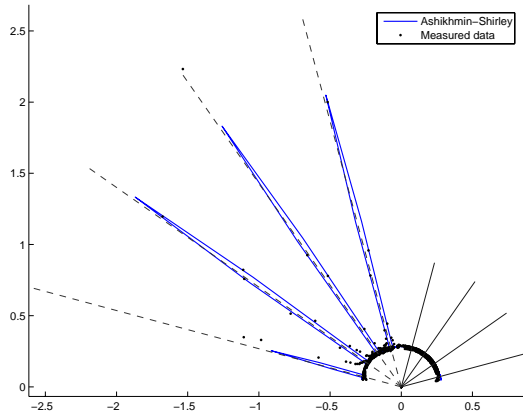
Ward-Duer



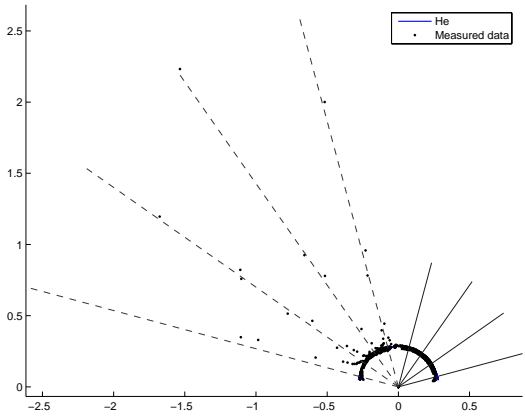
Cook-Torrance



Lafortune



Ashikhmin-Shirley



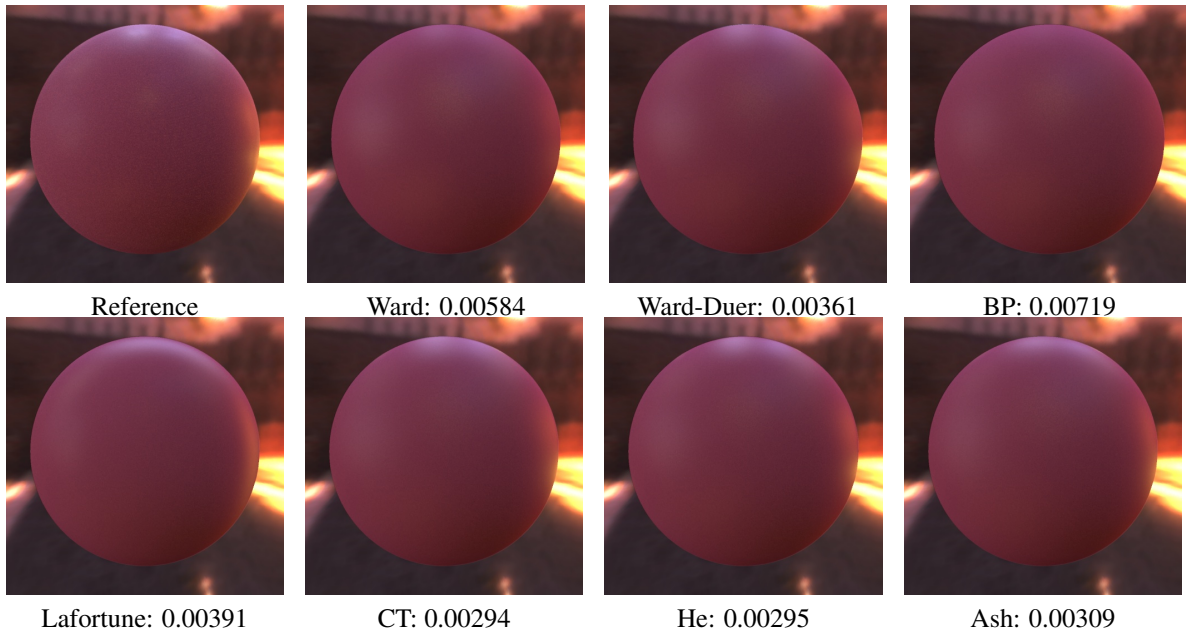
He

Material Name: violet-rubber

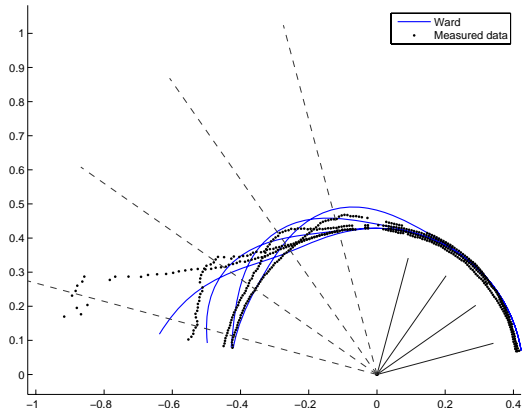
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.241	0.0495	0.0726	0.0275	0.0209	0.0152	0.222			0.00584
Ward-Duer	0.241	0.049	0.0724	0.0183	0.0147	0.0105	0.221			0.00361
Blinn-Phong	0.245	0.053	0.0749	0.00649	0.00455	0.00342	44			0.00719
Lafortune et al.	0.249	0.0552	0.0769	0.107	0.0909	0.0633	-0.609	0.508	29.5	0.00391
Cook-Torrance	0.243	0.0506	0.0736	0.0865	0.0714	0.0504	0.138	0.233		0.00294
He et al.	0.245	0.0518	0.0745	0.113	0.0932	0.0653	40	4.07	1.93	0.00295
Ashikhmin-Shirley	0.241	0.0486	0.0722	0.118	0.0961	0.0681	0.167	26.4		0.00309

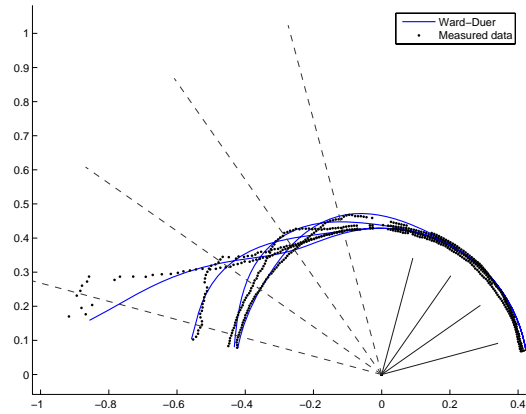
Rendered Images



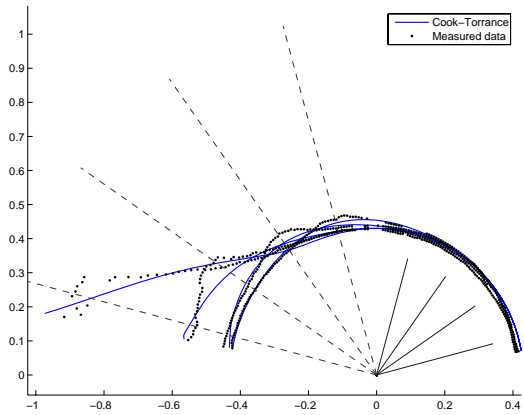
BRDF Plots in the incidence plane (Cubic root applied)



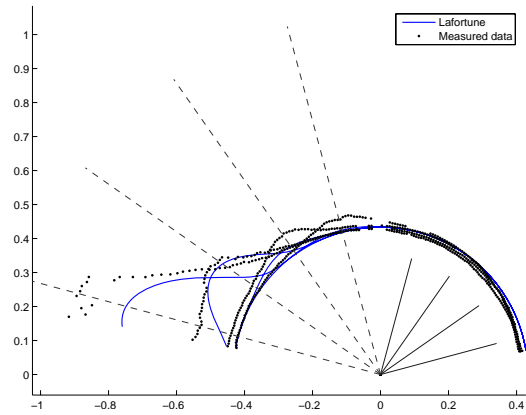
Ward



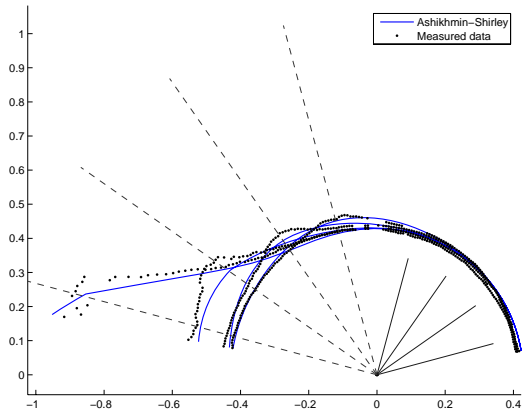
Ward-Duer



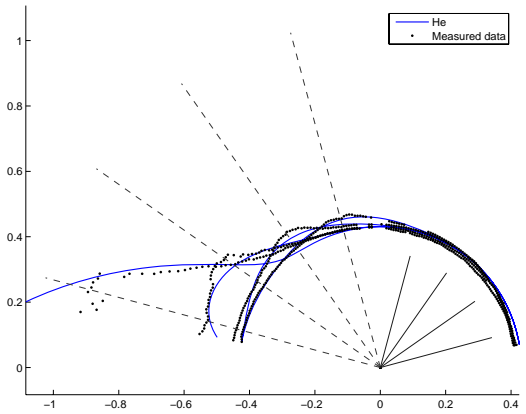
Cook-Torrance



Lafortune



Ashikhmin-Shirley



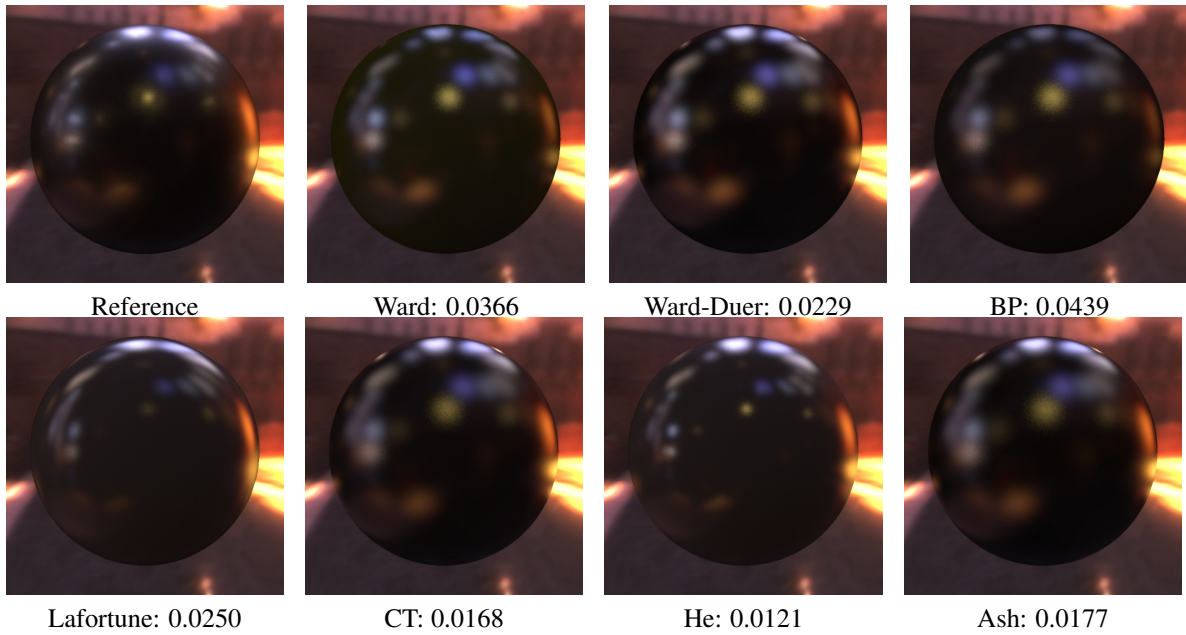
He

Material Name: walnut-dark-2716

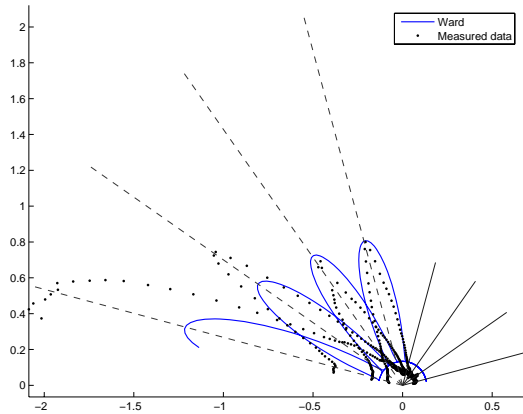
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.00709	0.00818	0	0.0323	0.0312	0.0243	0.068			0.0366
Ward-Duer	0	0	0	0.0324	0.0278	0.019	0.0754			0.0229
Blinn-Phong	0.00321	0.00218	0.00141	0.0117	0.0102	0.00705	296			0.0439
Lafortune et al.	0.0119	0.00983	0.00689	0.262	0.226	0.152	-0.582	0.567	242	0.025
Cook-Torrance	0.00133	0.000883	0.000789	0.17	0.145	0.0985	0.123	0.0844		0.0168
He et al.	0.011	0.00912	0.00635	25.6	21.9	14.9	6.26	0.102	1.04	0.0121
Ashikhmin-Shirley	0	0	0	0.188	0.161	0.109	0.141	251		0.0177

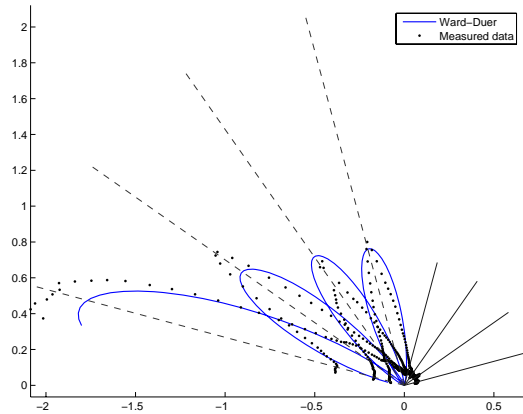
Rendered Images



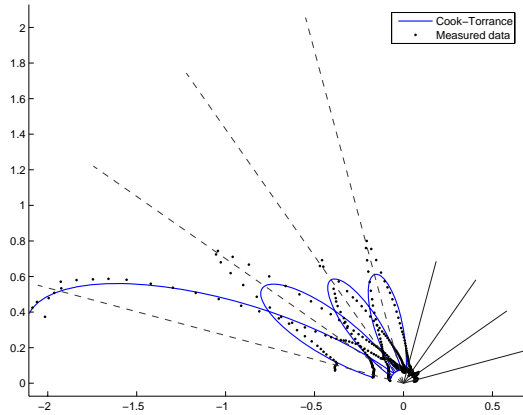
BRDF Plots in the incidence plane (Cubic root applied)



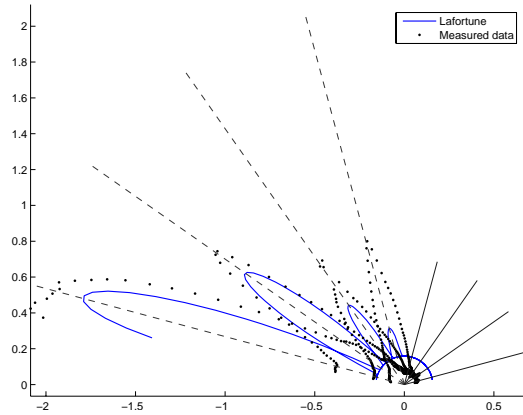
Ward



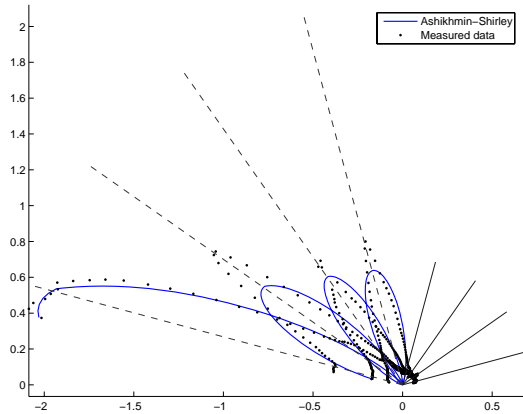
Ward-Duer



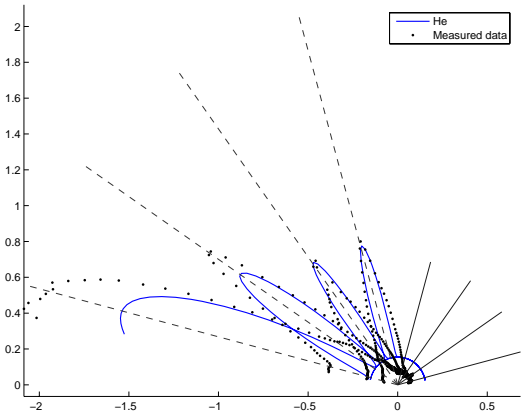
Cook-Torrance



Lafortune



Ashikhmin-Shirley



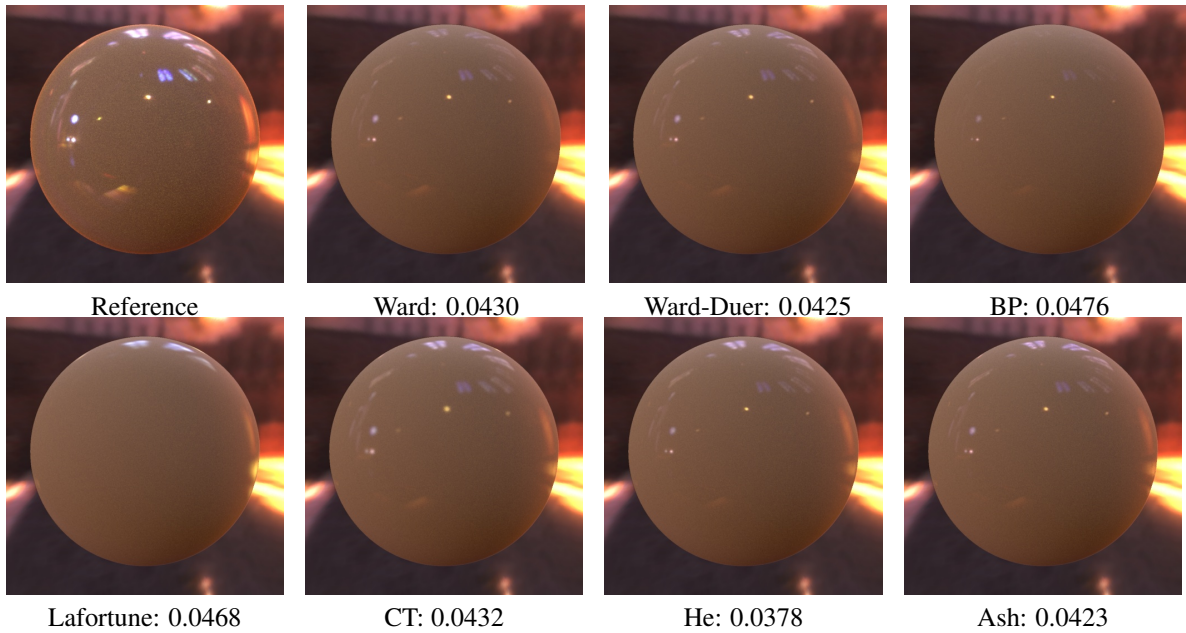
He

Material Name: white-bball

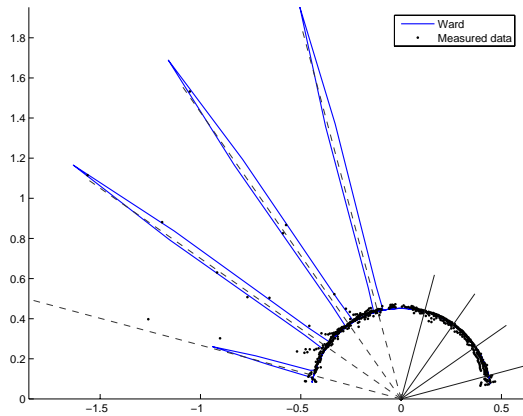
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.282	0.195	0.0739	0.00707	0.00429	0.0035	0.0083			0.043
Ward-Duer	0.282	0.195	0.0739	0.00502	0.00303	0.00254	0.00821			0.0425
Blinn-Phong	0.284	0.196	0.075	0.001	0.000612	0.000465	9.32e+004			0.0476
Lafortune et al.	0.285	0.197	0.0755	0.5	0.541	0.353	-0.58	0.573	2.42e+003	0.0468
Cook-Torrance	0.282	0.194	0.0733	0.0321	0.0243	0.0185	0.184	0.0164		0.0432
He et al.	0.282	0.195	0.0737	85.1	58.8	45.6	28	0.01	1.12	0.0378
Ashikhmin-Shirley	0.282	0.195	0.0739	0.0315	0.019	0.0162	0.145	3.14e+004		0.0423

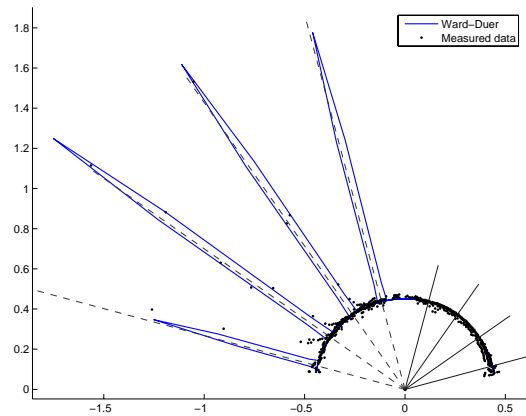
Rendered Images



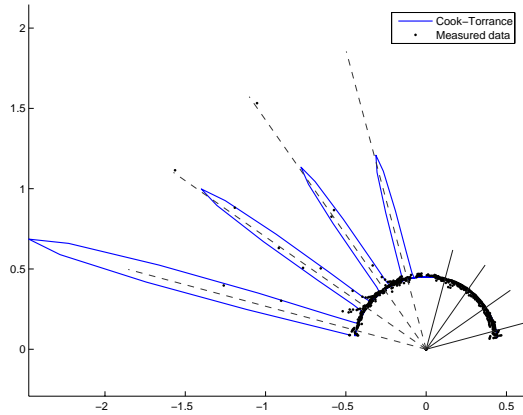
BRDF Plots in the incidence plane (Cubic root applied)



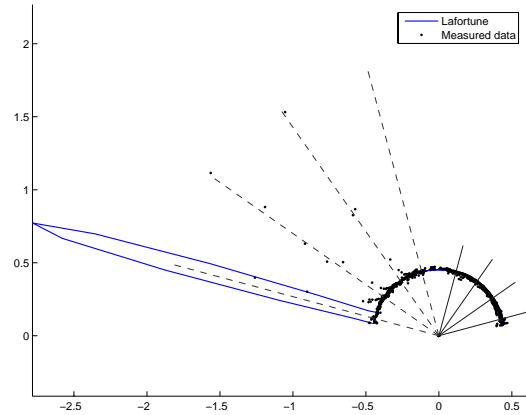
Ward



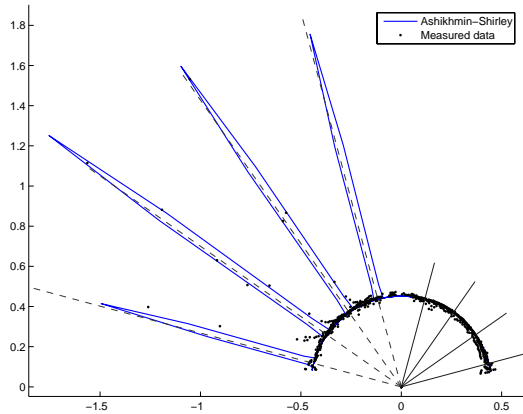
Ward-Duer



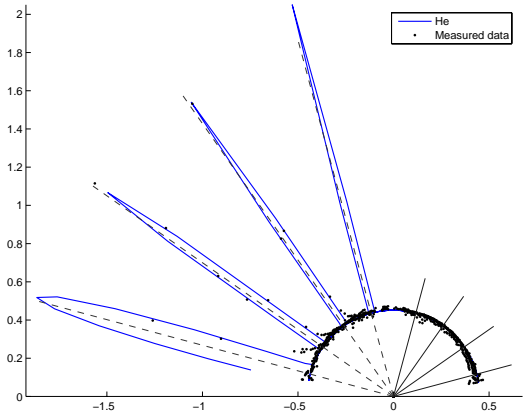
Cook-Torrance



Lafortune



Ashikhmin-Shirley



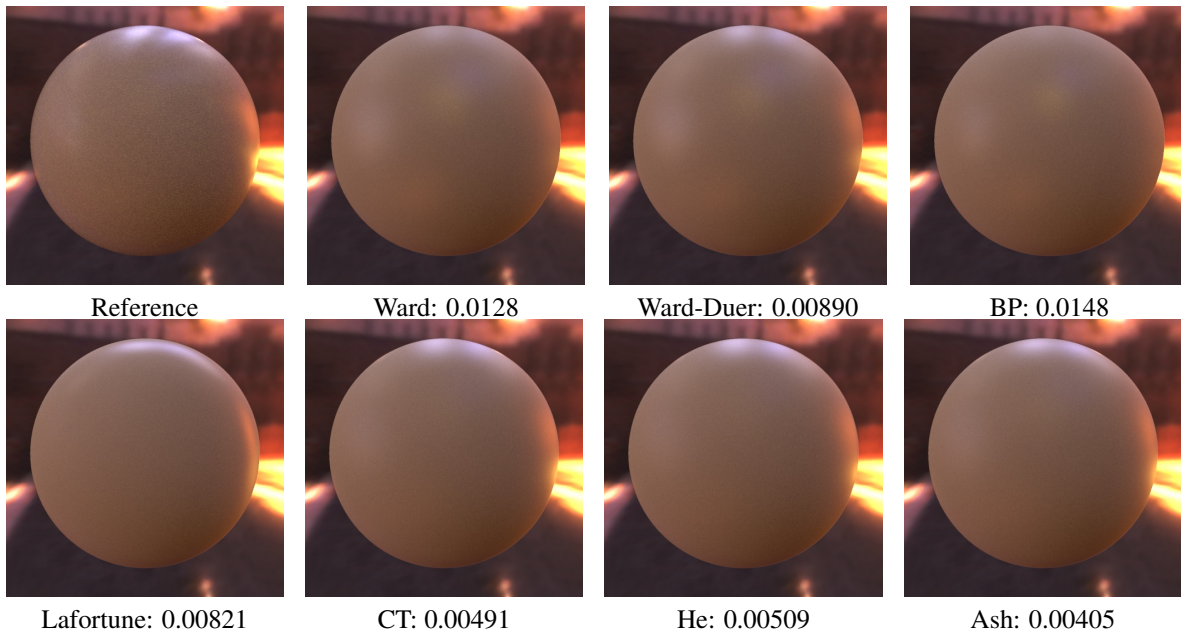
He

Material Name: white-diffuse-bball

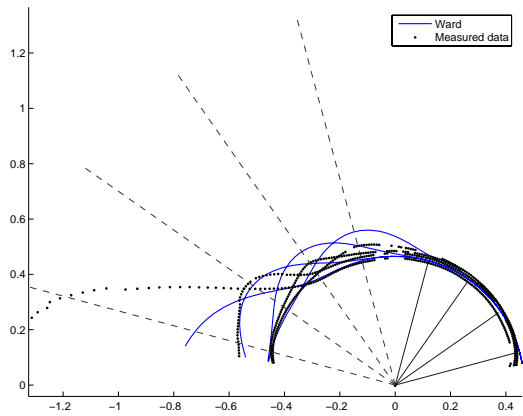
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.309	0.227	0.102	0.0375	0.0317	0.0203	0.188			0.0128
Ward-Duer	0.309	0.227	0.102	0.0253	0.0211	0.0139	0.175			0.0089
Blinn-Phong	0.317	0.234	0.107	0.00716	0.00615	0.00379	81.1			0.0148
Lafortune et al.	0.325	0.241	0.111	0.273	0.223	0.15	-0.604	0.521	81.2	0.00821
Cook-Torrance	0.316	0.233	0.106	0.187	0.154	0.103	0.0546	0.19		0.00491
He et al.	0.316	0.233	0.106	0.312	0.257	0.172	12	1.19	1.45	0.00509
Ashikhmin-Shirley	0.313	0.231	0.105	0.264	0.217	0.144	0.0685	42.9		0.00405

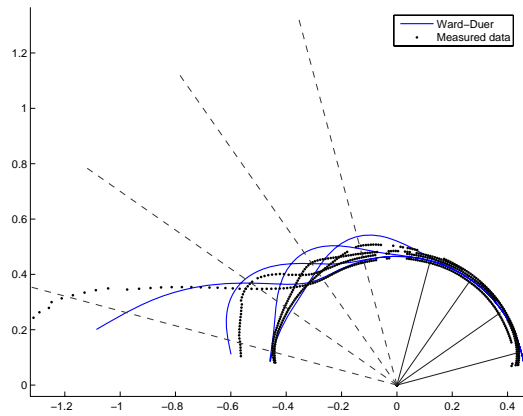
Rendered Images



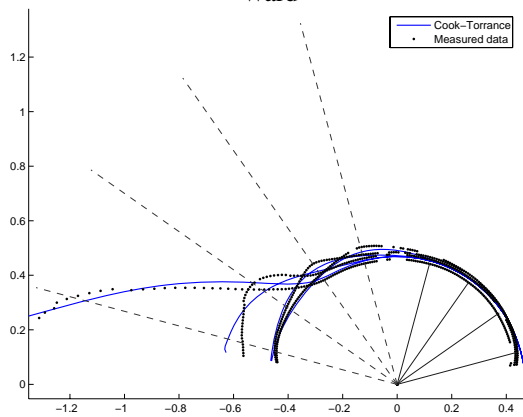
BRDF Plots in the incidence plane (Cubic root applied)



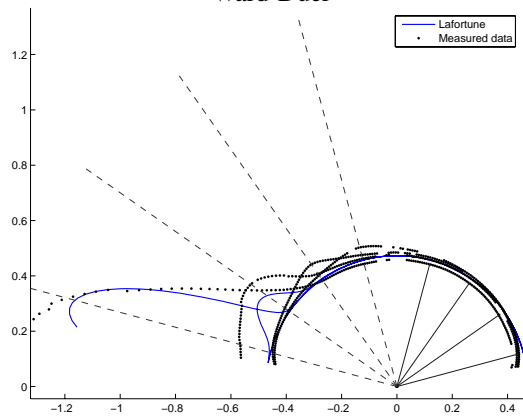
Ward



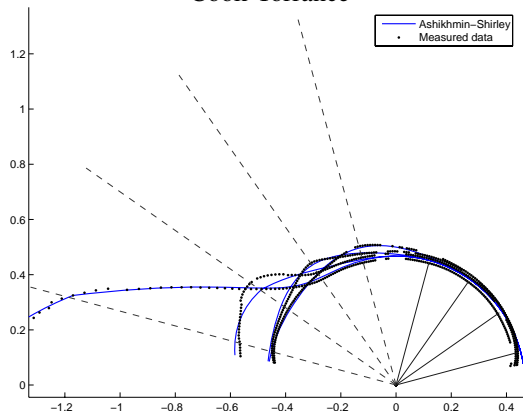
Ward-Duer



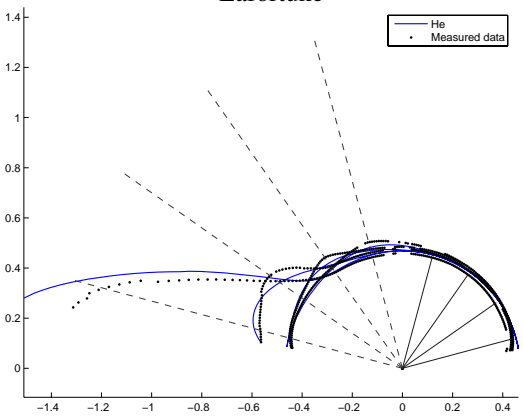
Cook-Torrance



Lafortune



Ashikhmin-Shirley



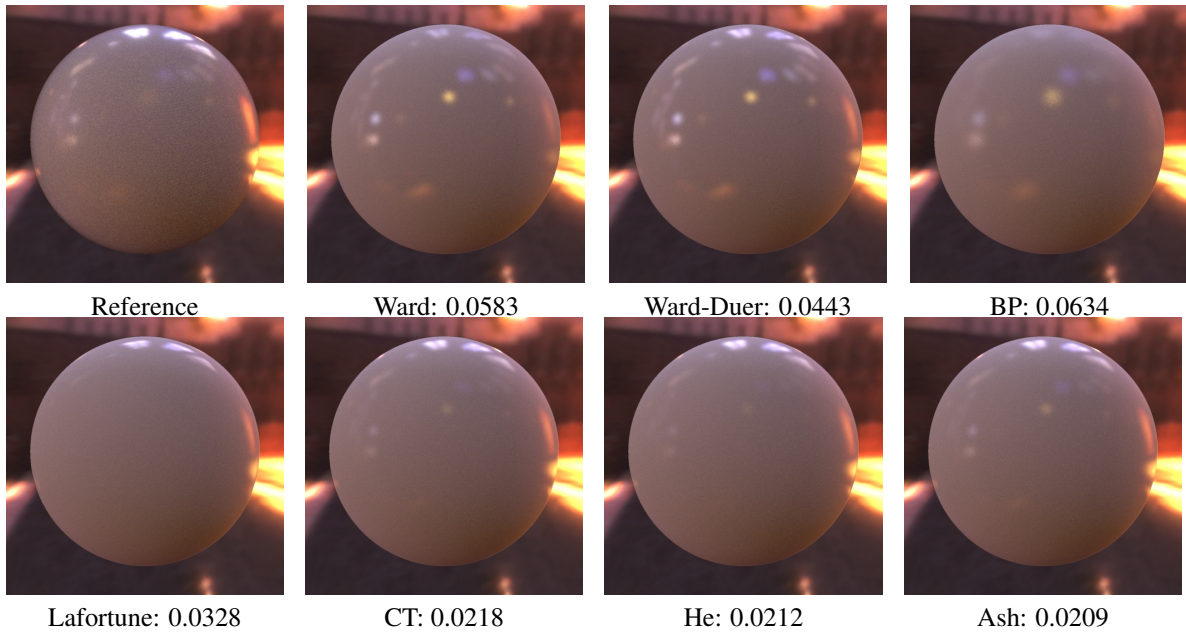
He

Material Name: white-paint

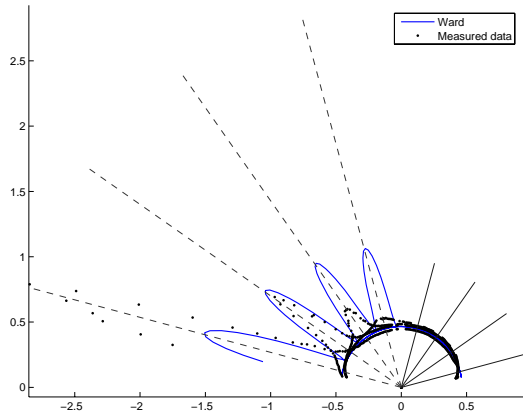
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.311	0.264	0.177	0.0219	0.0164	0.0116	0.0383			0.0583
Ward-Duer	0.308	0.262	0.176	0.0184	0.0139	0.01	0.0377			0.0443
Blinn-Phong	0.312	0.265	0.178	0.0068	0.00514	0.00358	499			0.0634
Lafortune et al.	0.321	0.271	0.183	0.436	0.325	0.244	-0.58	0.573	1.63e+003	0.0328
Cook-Torrance	0.317	0.269	0.181	0.183	0.137	0.101	0.0145	0.0386		0.0218
He et al.	0.318	0.269	0.181	0.342	0.258	0.19	28	0.596	1.15	0.0212
Ashikhmin-Shirley	0.316	0.268	0.18	0.162	0.121	0.0896	0.0296	1.2e+003		0.0209

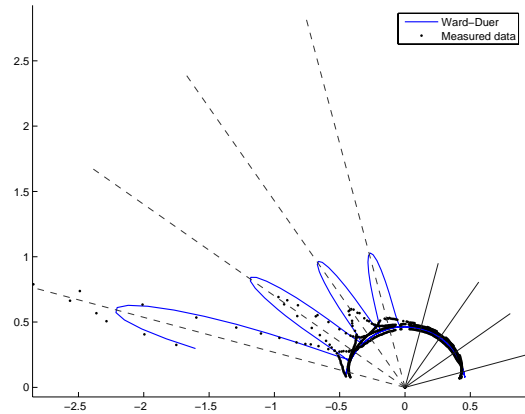
Rendered Images



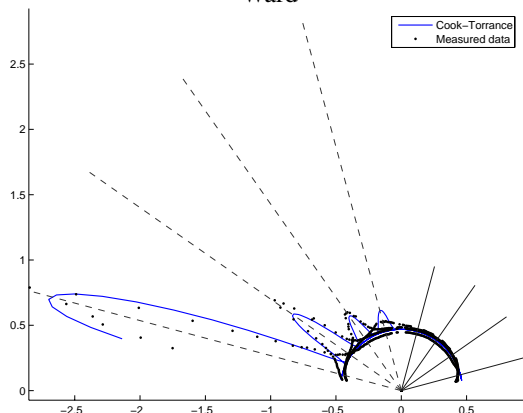
BRDF Plots in the incidence plane (Cubic root applied)



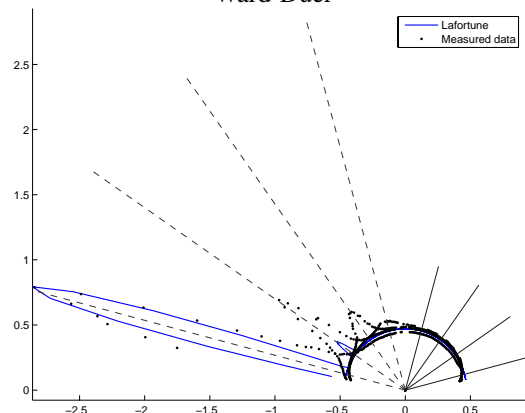
Ward



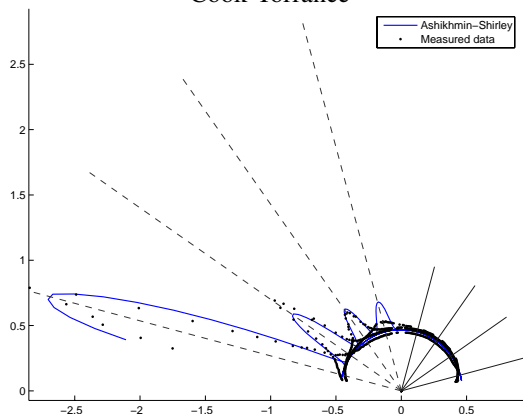
Ward-Duer



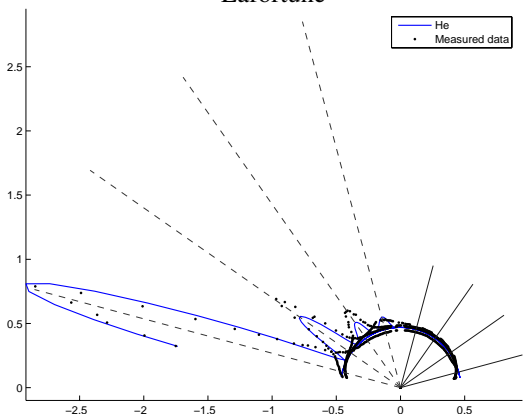
Cook-Torrance



Lafortune



Ashikhmin-Shirley



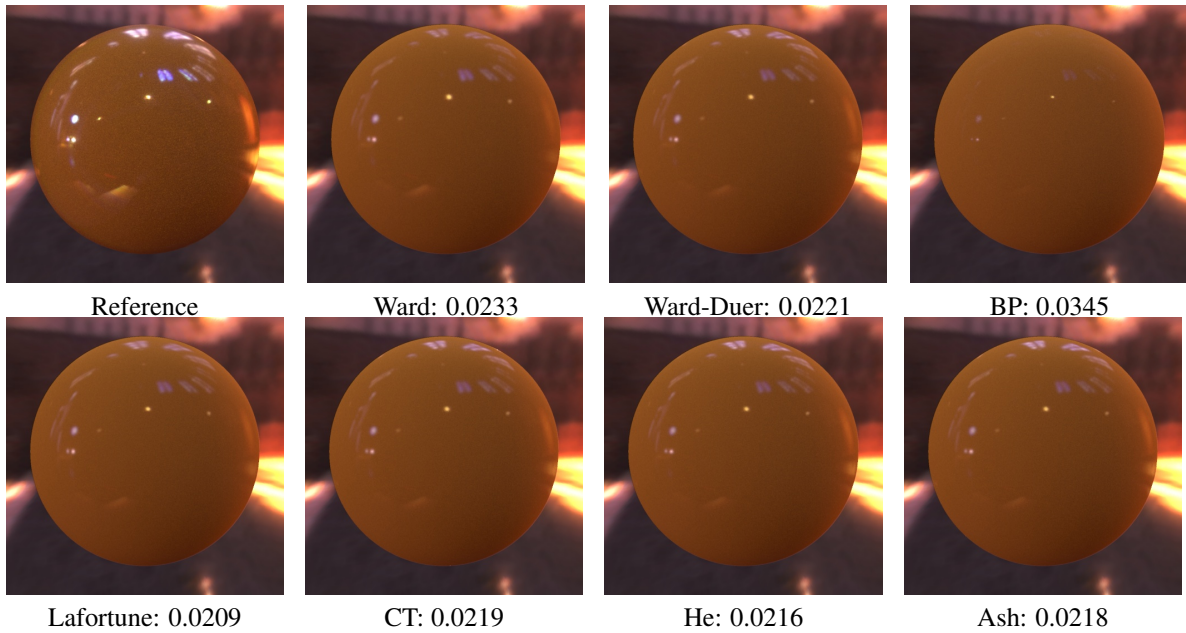
He

Material Name: yellow-bball

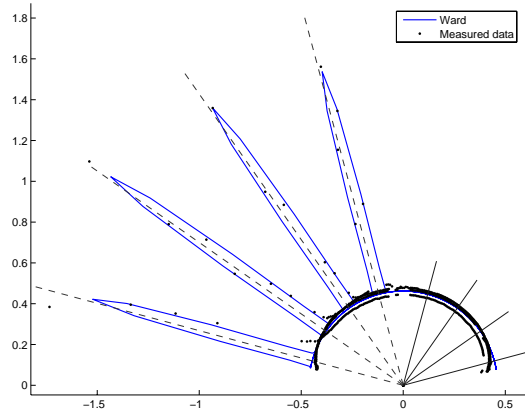
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.303	0.115	0.00832	0.00917	0.00594	0.00471	0.0137			0.0233
Ward-Duer	0.303	0.116	0.00858	0.00555	0.00365	0.00282	0.0129			0.0221
Blinn-Phong	0.307	0.118	0.0101	0.000493	0.000338	0.000288	1.14e+005			0.0345
Lafortune et al.	0.304	0.116	0.00863	0.0162	0.0108	0.00835	-0.577	0.577	4.77e+003	0.0209
Cook-Torrance	0.304	0.116	0.0086	0.0181	0.012	0.00929	0.295	0.0129		0.0219
He et al.	0.304	0.116	0.0087	0.0268	0.0176	0.0136	63.5	0.378	2.45	0.0216
Ashikhmin-Shirley	0.304	0.116	0.00865	0.0176	0.0118	0.00913	0.286	1.28e+004		0.0218

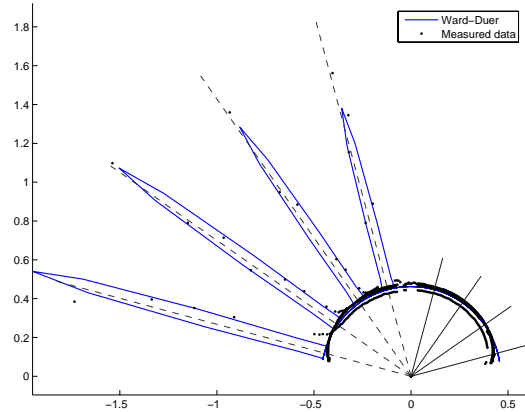
Rendered Images



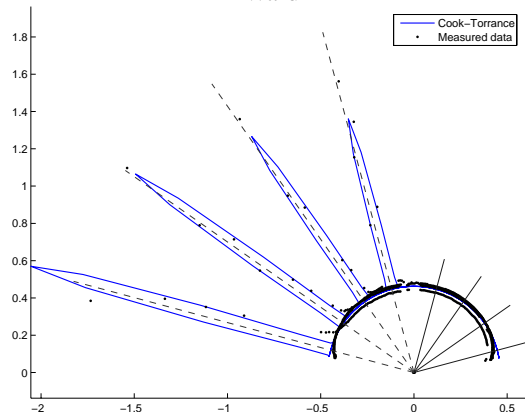
BRDF Plots in the incidence plane (Cubic root applied)



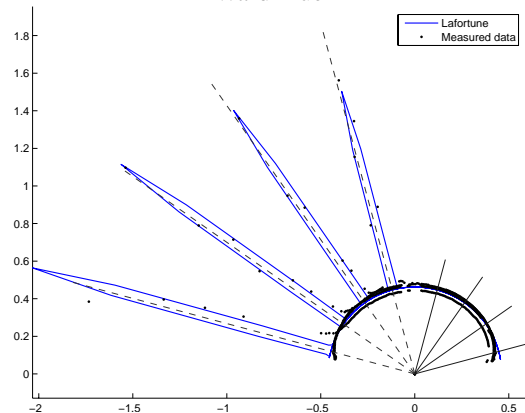
Ward



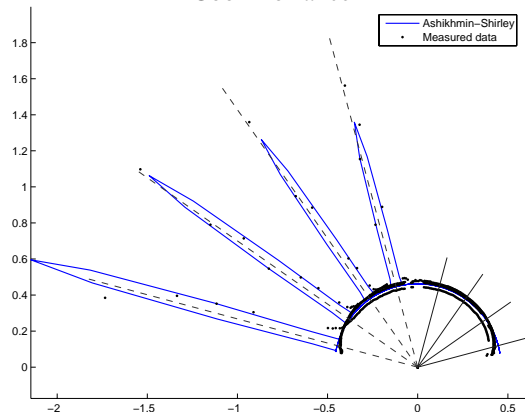
Ward-Duer



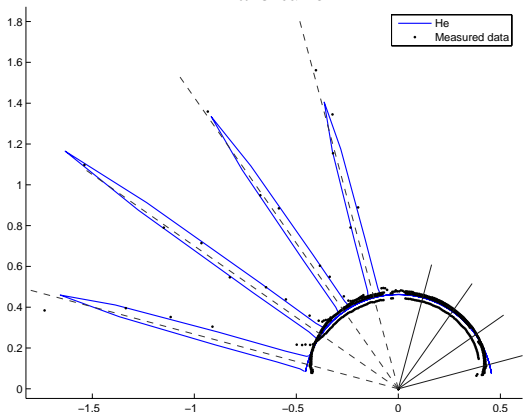
Cook-Torrance



Lafortune



Ashikhmin-Shirley



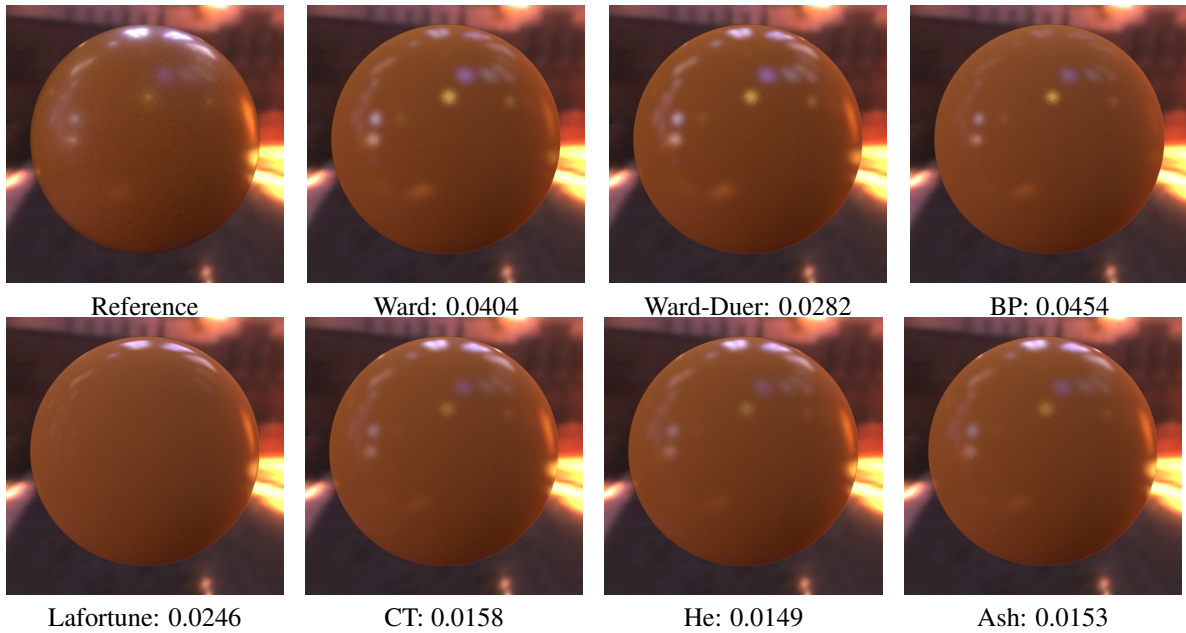
He

Material Name: yellow-matte-plastic

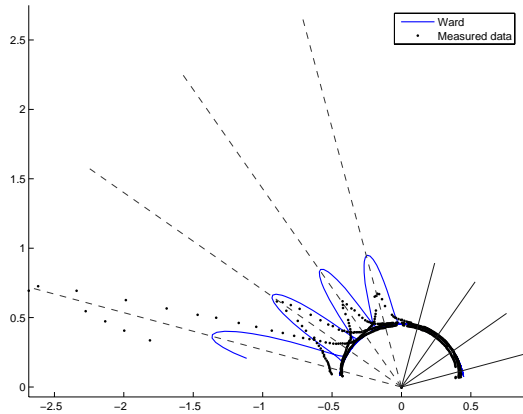
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.287	0.099	0.0127	0.0234	0.0187	0.0123	0.0476			0.0404
Ward-Duer	0.285	0.0975	0.0114	0.0181	0.0144	0.0098	0.0464			0.0282
Blinn-Phong	0.293	0.104	0.0162	0.00424	0.00333	0.00211	1.25e+003			0.0454
Lafortune et al.	0.297	0.107	0.0179	0.216	0.167	0.116	-0.579	0.573	1.14e+003	0.0246
Cook-Torrance	0.291	0.102	0.0146	0.116	0.0923	0.0653	0.056	0.0489		0.0158
He et al.	0.291	0.102	0.0145	0.137	0.108	0.0762	28	0.711	1.56	0.0149
Ashikhmin-Shirley	0.29	0.102	0.0141	0.131	0.104	0.0738	0.0674	750		0.0153

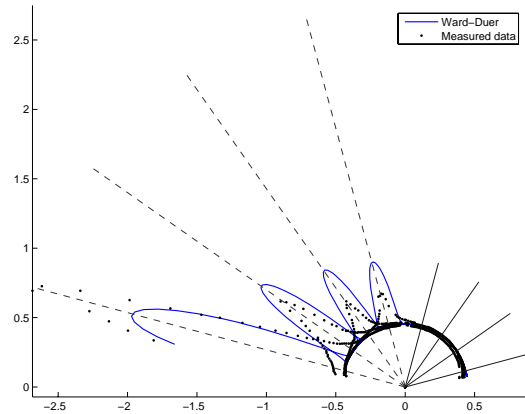
Rendered Images



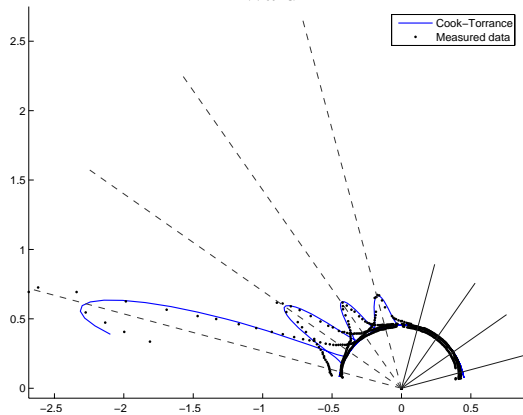
BRDF Plots in the incidence plane (Cubic root applied)



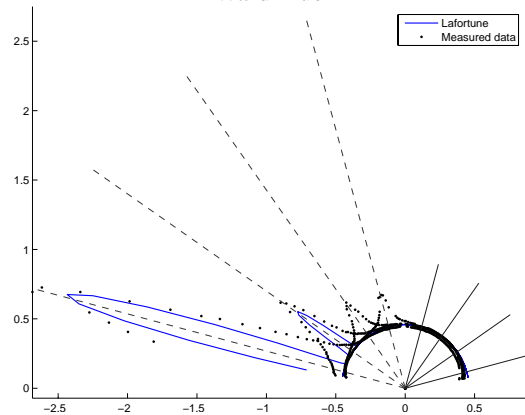
Ward



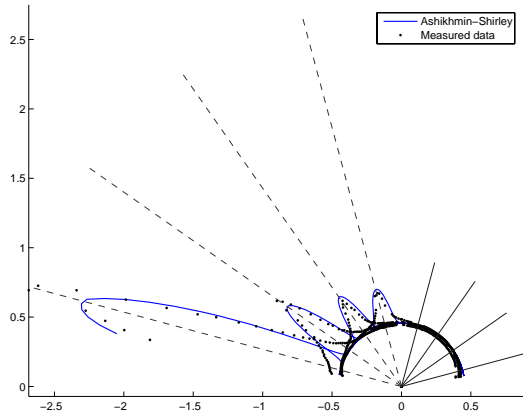
Ward-Duer



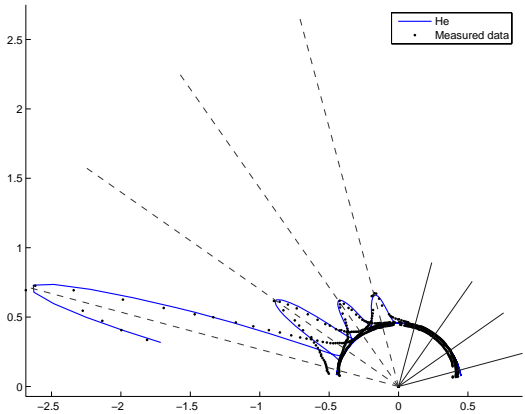
Cook-Torrance



Lafortune



Ashikhmin-Shirley



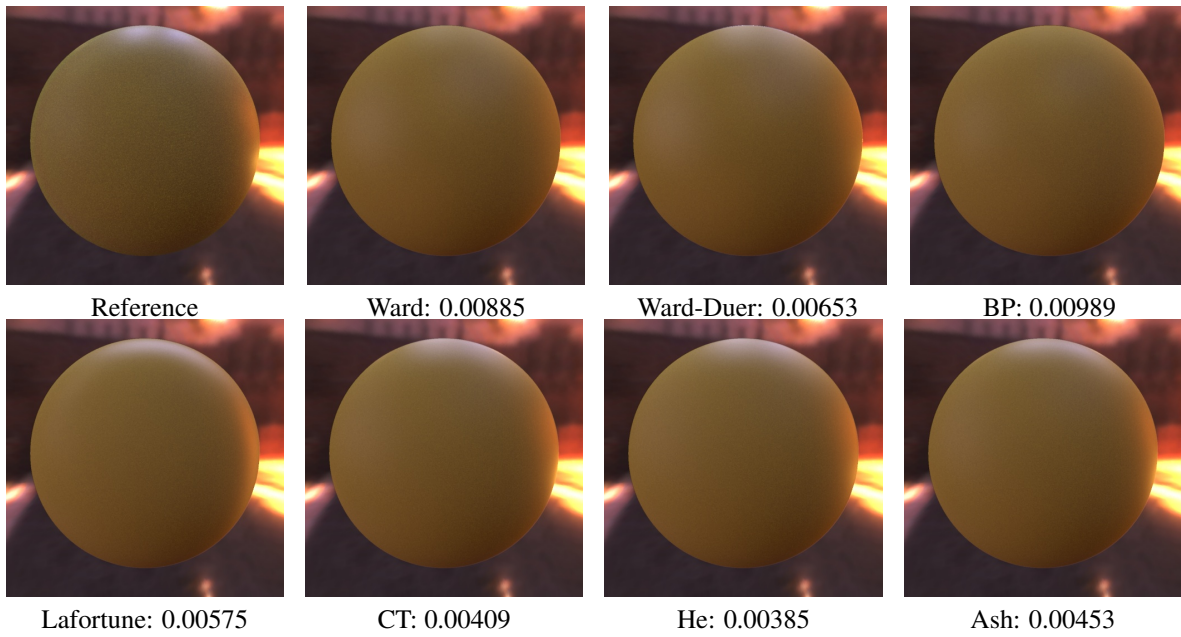
He

Material Name: yellow-plastic

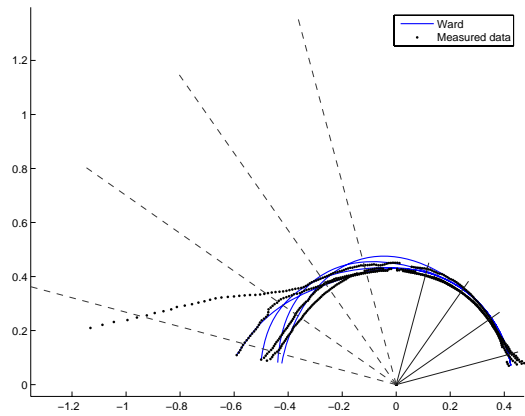
Fitted Parameters/Error

Model	d_r	d_g	d_b	s_r	s_g	s_b	p_0	p_1	p_2	Error
Ward	0.244	0.179	0.0217	0.0306	0.0282	0.0159	0.281			0.00885
Ward-Duer	0.24	0.177	0.02	0.0257	0.022	0.0128	0.282			0.00653
Blinn-Phong	0.253	0.187	0.0263	0.00376	0.00389	0.00213	45.3			0.00989
Lafortune et al.	0.254	0.189	0.0271	0.219	0.179	0.109	-0.636	0.438	26	0.00575
Cook-Torrance	0.247	0.184	0.0238	0.201	0.166	0.101	0.0431	0.282		0.00409
He et al.	0.245	0.182	0.0229	0.604	0.495	0.301	4	0.697	1.31	0.00385
Ashikhmin-Shirley	0.246	0.183	0.023	0.285	0.237	0.146	0.0552	19.2		0.00453

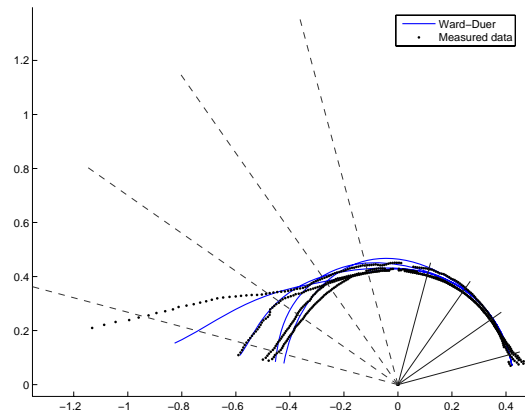
Rendered Images



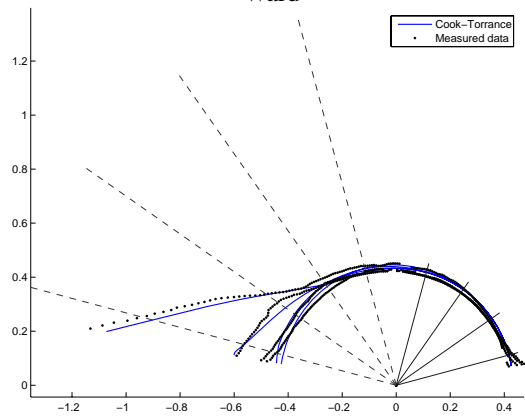
BRDF Plots in the incidence plane (Cubic root applied)



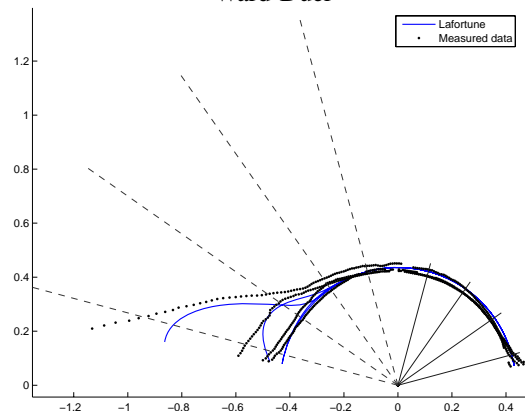
Ward



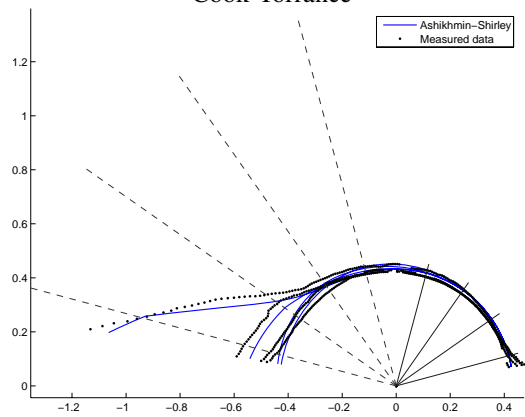
Ward-Duer



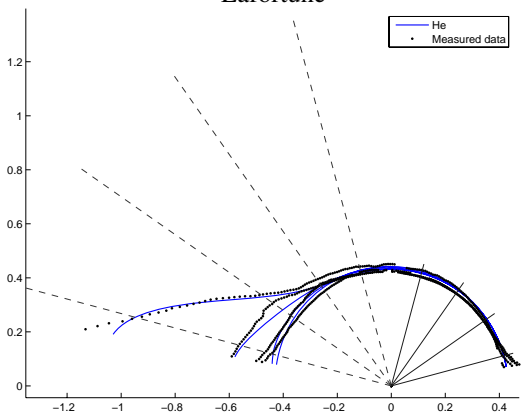
Cook-Torrance



Lafortune



Ashikhmin-Shirley



He