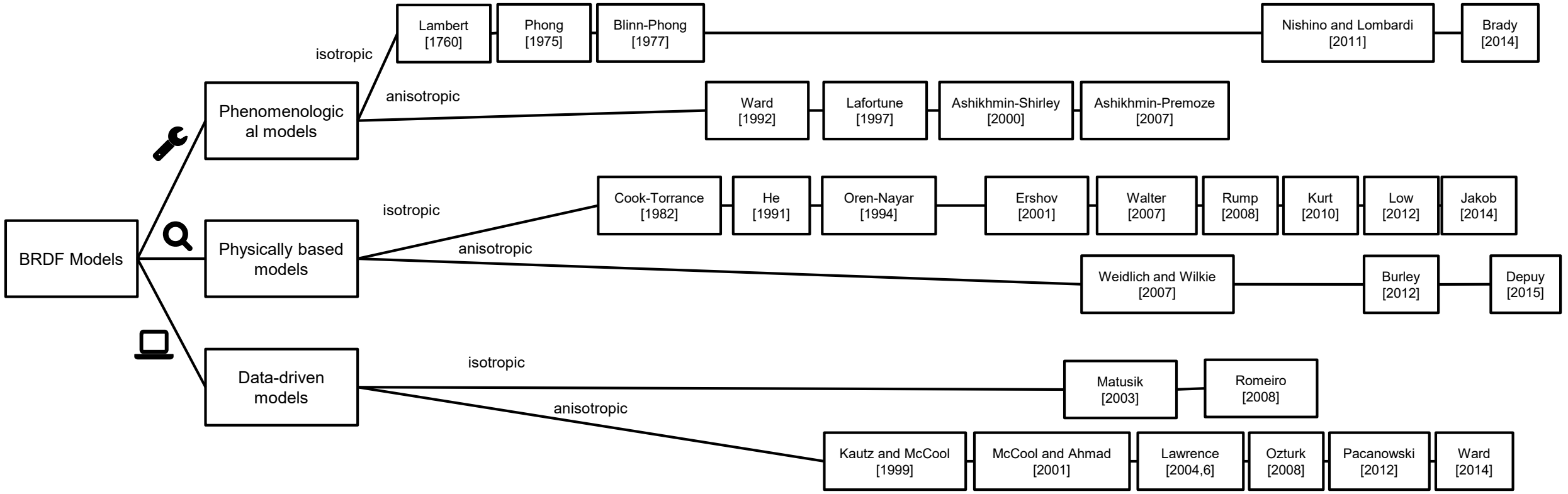
BRDFモデル一覧


BRDF Models
Phenomenological models
isotropic
anisotropic
Lambert [1760]
Phong [1975]
Blinn-Phong [1977]
Nishino and Lombardi [2011]
Brady [2014]
Ward [1992]
Lafortune [1997]
Ashikhmin-Shirley [2000]
Ashikhmin-Premoze [2007]
Physically based models
isotropic
anisotropic
Cook-Torrance [1982]
He [1991]
Oren-Nayar [1994]
Ershov [2001]
Walter [2007]
Rump [2008]
Kurt [2010]
Low [2012]
Jakob [2014]
Weidlich and Wilkie [2007]
Burley [2012]
Depuy [2015]
Data-driven models
isotropic
anisotropic
Matusik [2003]
Romeiro [2008]
Kautz and McCool [1999]
McCool and Ahmad [2001]
Lawrence [2004,6]
Ozturk [2008]
Pacanowski [2012]
Ward [2014]

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Common $G = \min\left(1, \frac{2(N \cdot H)(N \cdot V)}{V \cdot H}, \frac{2(N \cdot H)(N \cdot L)}{V \cdot H}\right)$

※F0と拡散・鏡面Albedoは除外 $F = F_0 + (1 - F_0)(1 - \cos\theta)^5$ $F_0 = \left(\frac{n_1 - n_2}{n_1 + n_2}\right)^2$

Year	Model	Anisotropic	Parameter※	Formula
1760	Lambert（ランバート）		0	$i_d = \rho_d \frac{1}{\pi}$
1975	Phong（フォン）		1	$i = \rho_d \frac{1}{\pi} + i_s \quad i_s = \rho_s (R \cdot V)^m$
1977	Blinn-Phong（ブリンフォン）		1	$i = \rho_d \frac{1}{\pi} + i_s \quad i_s = \rho_s (N \cdot H)^m$
1985	Cook-Torrance（クック・トランス）		1	$i = \rho_d \frac{1}{\pi} + \rho_s \frac{DGF}{\pi (N \cdot L)(N \cdot V)} \quad D = \frac{1}{4m^2 (N \cdot H)^4} \exp\left(-\frac{1 - (N \cdot H)^2}{m^2 (N \cdot H)^2}\right)$
1992	Ward（ウォード）	✓	2	$i = \rho_d \frac{1}{\pi} + \rho_s \frac{DGF}{\pi (N \cdot L)(N \cdot V)} \quad D_{anisotropic} = \frac{1}{4\pi m_x m_y \sqrt{(N \cdot L)(N \cdot V)}} \exp\left(-\tan^2(\theta_h)\left(\frac{(V \cdot H)^2}{m_x^2} + \frac{(V \cdot H)^2}{m_y^2}\right)\right)$
1994	Oren-Nayar（オーレン・ネイヤー）		1	$i_d = \rho_d \frac{1}{\pi}\left(1 - \frac{0.5m}{m + 0.33} + \frac{0.44m}{m + 0.99} \cos(\phi_i - \phi_r) \sin\left(\max(\theta_i, \theta_r)\right) \tan\left(\min(\theta_i, \theta_r)\right)\right)$
1997	Lafortune（ラフォーチュン）	✓	4 x lobe数	$i = \rho_d \frac{1}{\pi} + i_s \quad i_s = \sum_{l=1}^{N} \left(C_{x,l} L_{x,l} V_{x,l} + C_{y,l} L_{y,l} V_{y,l} + C_{z,l} L_{z,l} V_{z,l}\right)^{m,l}$
2000	Ashikhmin-Shirley（アシクミンシャーリー）	✓	2	$i_s = \frac{DF}{2(V \cdot H)\max\left((N \cdot L), (N \cdot V)\right)} \quad i_d = \rho_d (1 - \rho_s) \frac{28}{23\pi}\left(1 - \left(1 - \frac{(N \cdot L)}{2}\right)^5\right)\left(1 - \left(1 - \frac{(N \cdot V)}{2}\right)^5\right) \quad D = \frac{\sqrt{(m_x + 1)(m_y + 1)}(N \cdot H)^{m_x \cos^2\phi_h + m_y \sin^2\phi_h}}{4\pi}$
2007	Walter（ウォルター）		1	$i = \rho_d \frac{1}{\pi} + \rho_s \frac{DGF}{\pi (N \cdot L)(N \cdot V)} \quad D = \frac{m^2 \chi^+(N \cdot H)}{\pi \cos^4\theta_h (m^2 + \tan^2\theta_h)^2} \quad G = \chi^+\left(\frac{L \cdot H}{L \cdot N}\right) \frac{2}{1 + \sqrt{1 + m^2 \tan^2\theta_i}} \cdot \chi^+\left(\frac{V \cdot H}{V \cdot N}\right) \frac{2}{1 + \sqrt{1 + m^2 \tan^2\theta_r}}$
2010	Kurt（カート）		2 x lobe数	$i = \rho_d \frac{1}{\pi} + i_s \quad i_s = \sum_{l=1}^{N} \frac{\rho_{s,l} D_l F_l}{4(V \cdot H)\left((L \cdot N)(V \cdot N)\right)^{m_l}}$
2011	Nishino and Lombardi（ニシノ・ロンバーディ）		3	$i = \rho_d \frac{1}{\pi} + \rho_s \frac{DGF}{\pi (N \cdot L)(N \cdot V)} \quad D = C\left(1 - \exp\left(-k(N \cdot H)^m\right)\right)$
2012	Low（ロー）		3	$i = \rho_d \frac{1}{\pi} + \rho_s \frac{DGF}{\pi (N \cdot L)(N \cdot V)} \quad D = \frac{a}{\left(1 + b(1 - (N \cdot H))\right)^c}$
2012	Burley (バーレー) or Disney (ディズニー)	✓	9	$i = i_d + i_{s1} + i_{s2}$ $i_{s1} = G_1 D_1 F_1$ $i_{s2} = 0.25 k_b G_2 D_2 F_2$ $F_2 = 0.04 + F_h(1 - 0.04)$
2014	Brady（ブレディー）		2	$i = \rho_d \frac{1}{\pi} + \rho_s \frac{F}{4(L \cdot H)} \exp\left(-\left(\frac{\tan\theta_h}{\beta^2}\right)^\alpha\right)$