Rendu réaliste en temps réel de la peau

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Différence

(a)

(b)

Méthode naïve

Méthode avancée

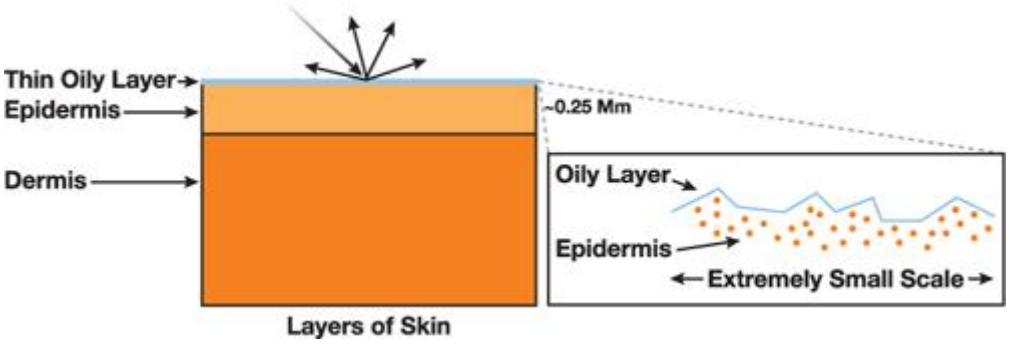
Pourquoi?

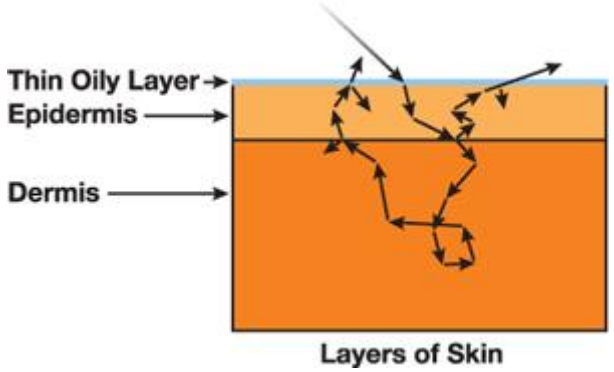
(a) (b)

-Reflectance (spécularité)

-Subsurface Scattering : Transluminescence

Modélisation la peau





Kelemen/Szirmay-Kalos (terme spéculaire)

$$f_{r,spec} = P_{\vec{H}}(\vec{H}).F(\lambda, \vec{H}.\vec{L}).G(\vec{N}, \vec{L}, \vec{V})$$

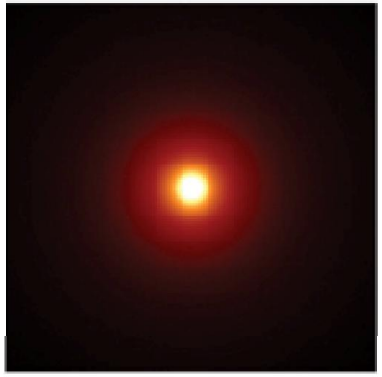
$$P_{\vec{H}}(\vec{H}) = \frac{\exp\left(-\frac{\tan\alpha}{m}\right)^2}{m^2.\left(\vec{N}.\vec{H}\right)^4},$$

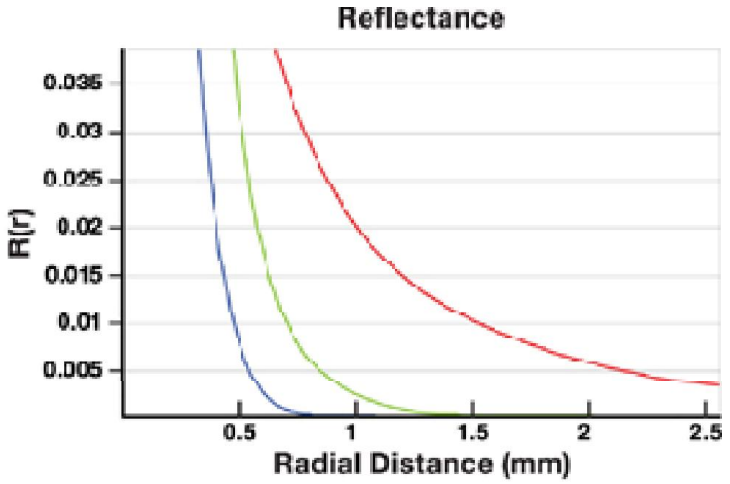
$$G(\vec{N}, \vec{L}, \vec{V}) = (\vec{L} + \vec{V})^2 = \vec{h}.\vec{h},$$

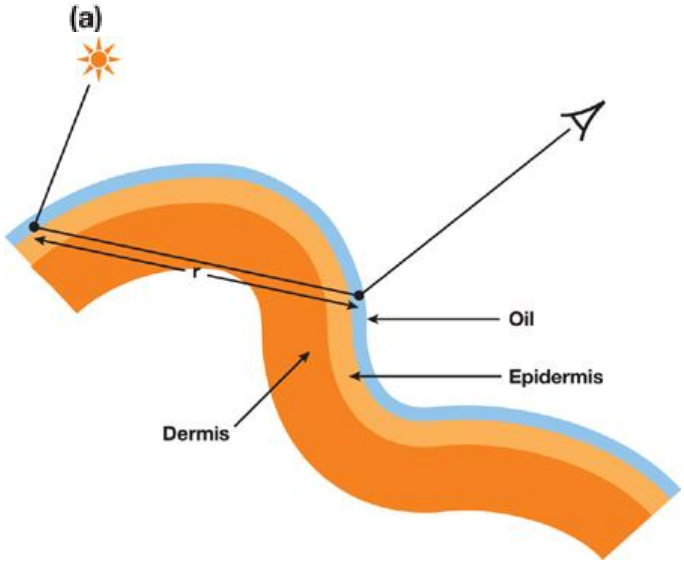
$$F(\lambda, \vec{H}.\vec{L}) = \left(1 - \vec{V}.\vec{H}\right)^5 + F_0\left(1 - \left(1 - \vec{V}.\vec{H}\right)^5\right)$$

Subsurface Scattering (Transluminescence)

Profile de diffusion :





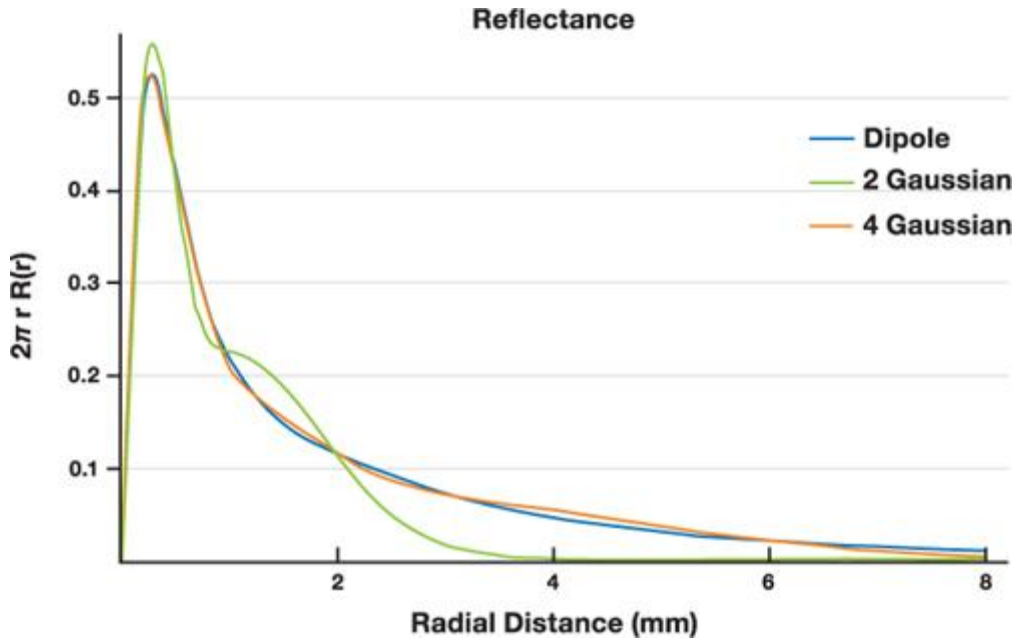


A Sum-of-Gaussians Diffusion Profile

$$R(r) \approx \sum_{i=1}^{k} w_i G(v_i, r),$$

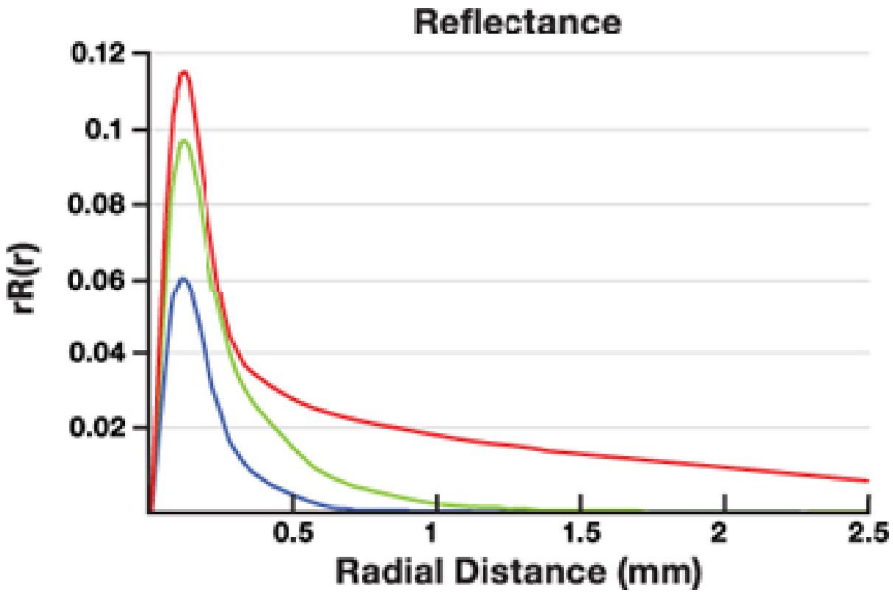
$$G(v, r) := \frac{1}{2\pi v} e^{-r^2/(2v)}.$$

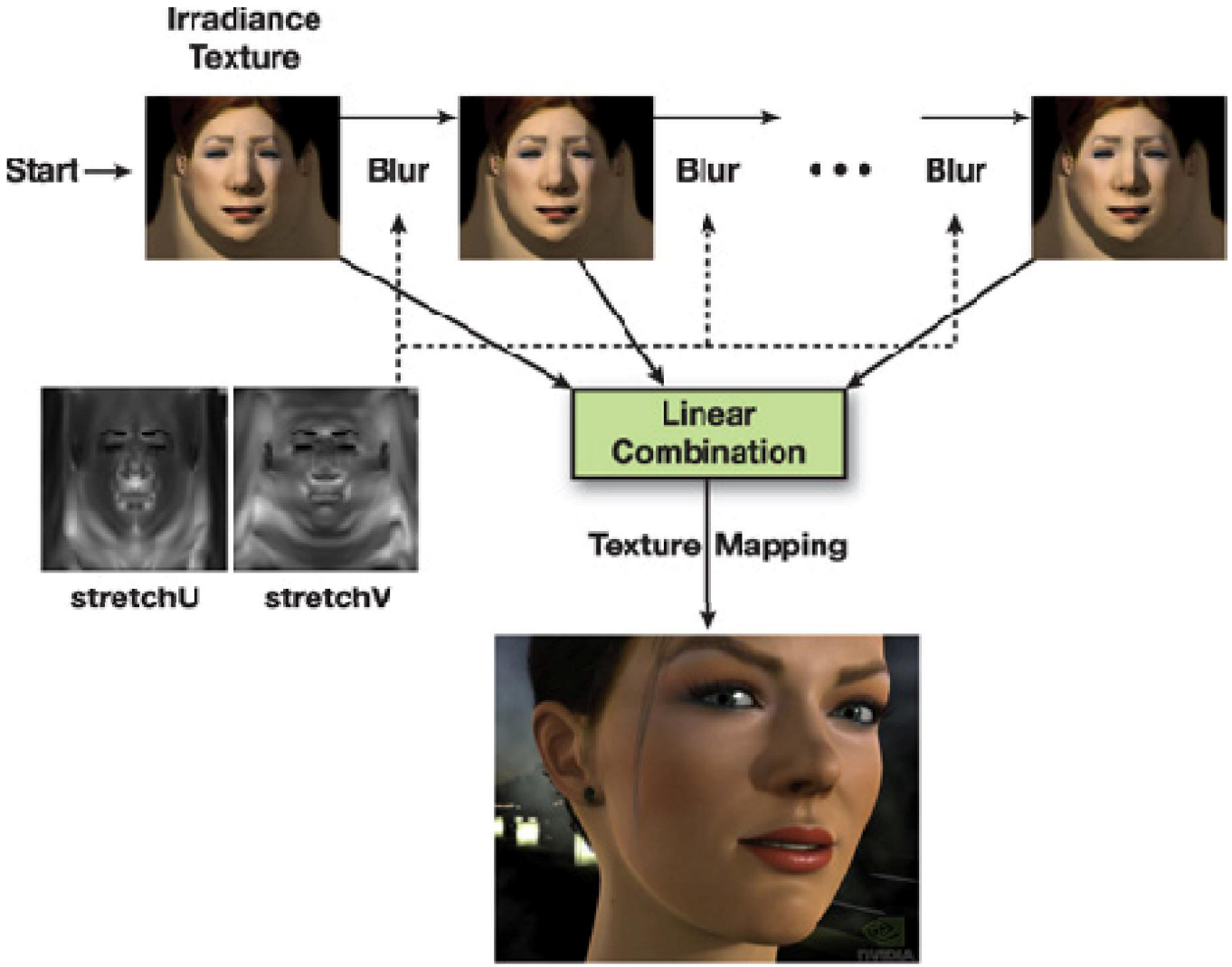
Minimiser l'erreur $$\int_0^\infty r \left(R(r) - \sum_{i=1}^{k} w_i G(v_i, r) \right)^2 dr.$$



Résultats

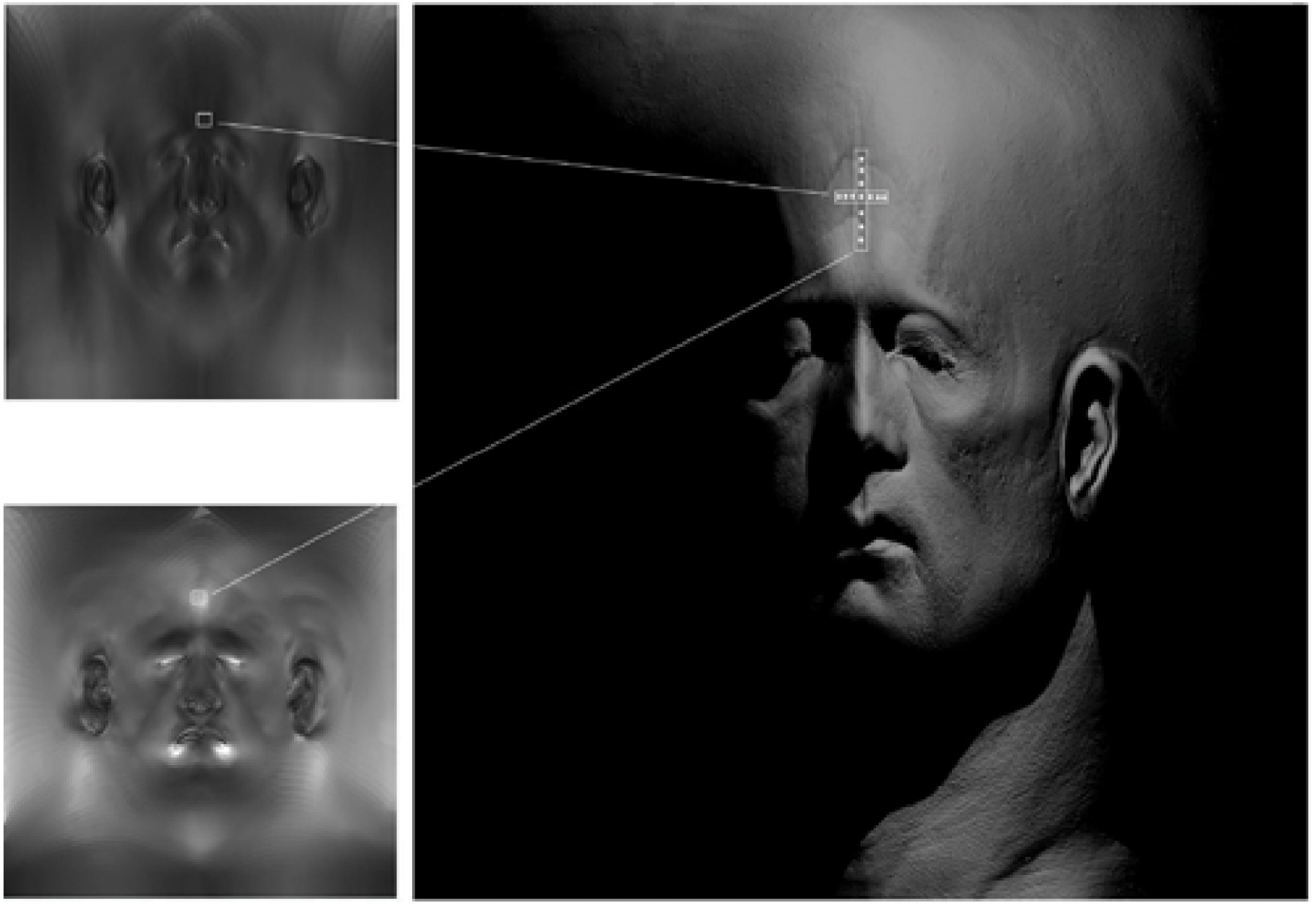
	Variance (mm^2)	Blur Weights Red	Green	Blue
	0.0064	0.233	0.455	0.649
	0.0484	0.100	0.336	0.344
	0.187	0.118	0.198	0
	0.567	0.113	0.007	0.007
	1.99	0.358	0.004	0
	7.41	0.078	0	0



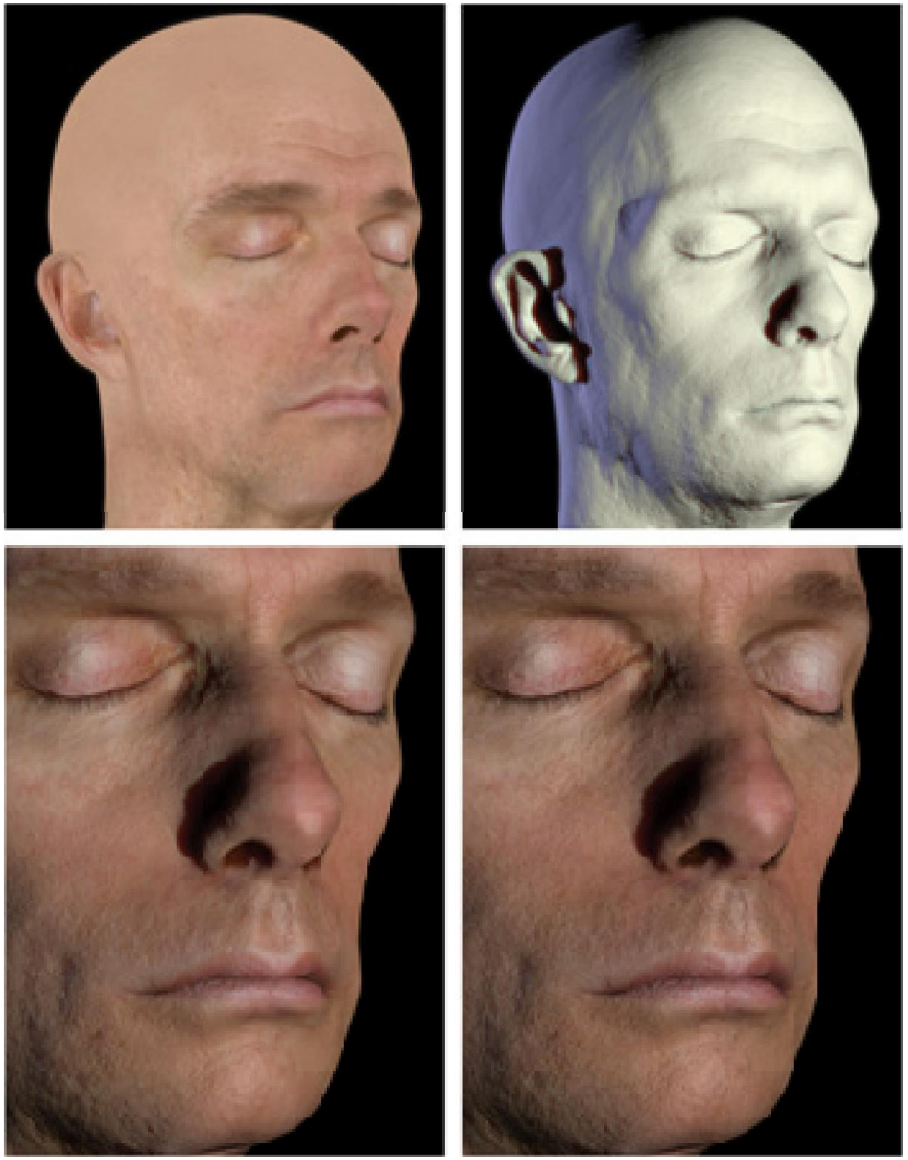


Final Pass: Combine Blurs + Specular

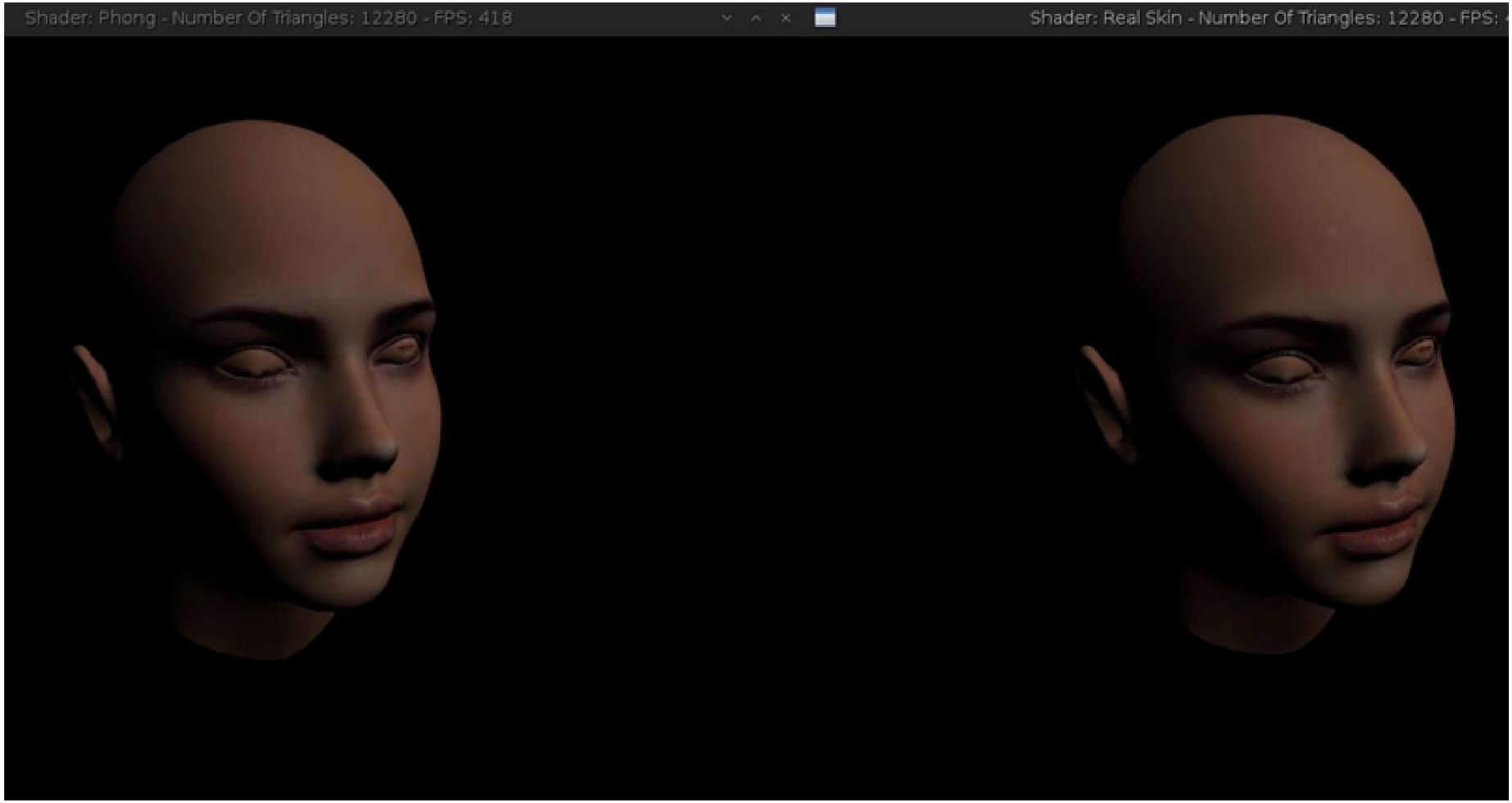
$$I * \left(\sum_{i=1}^{k} w_i G\left(v_i,\ r\right) \right) = \sum_{i=1}^{k} w_i I * G\left(v_i,\ r\right).$$



Post-Scatter Texturing



Résultats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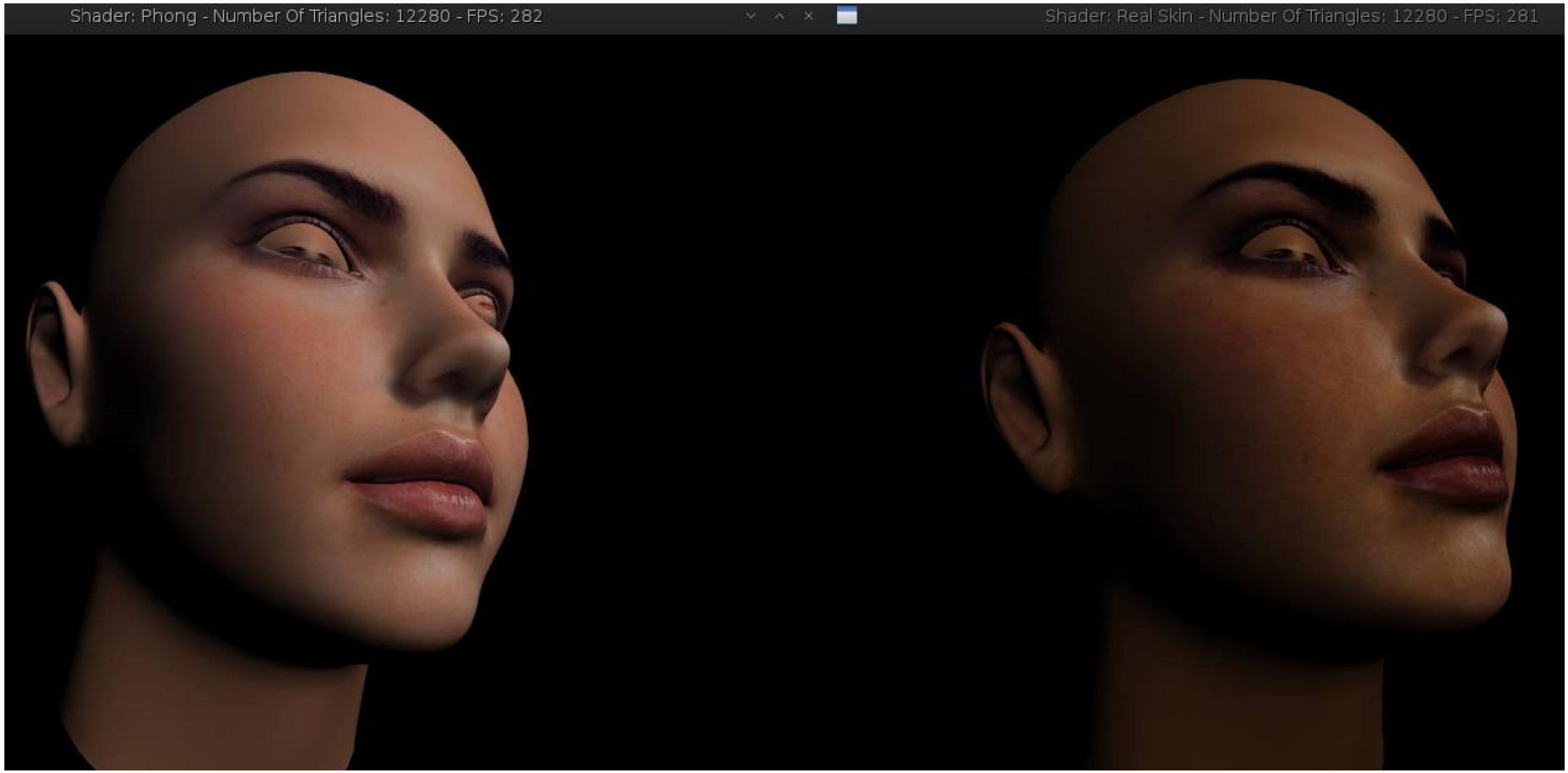
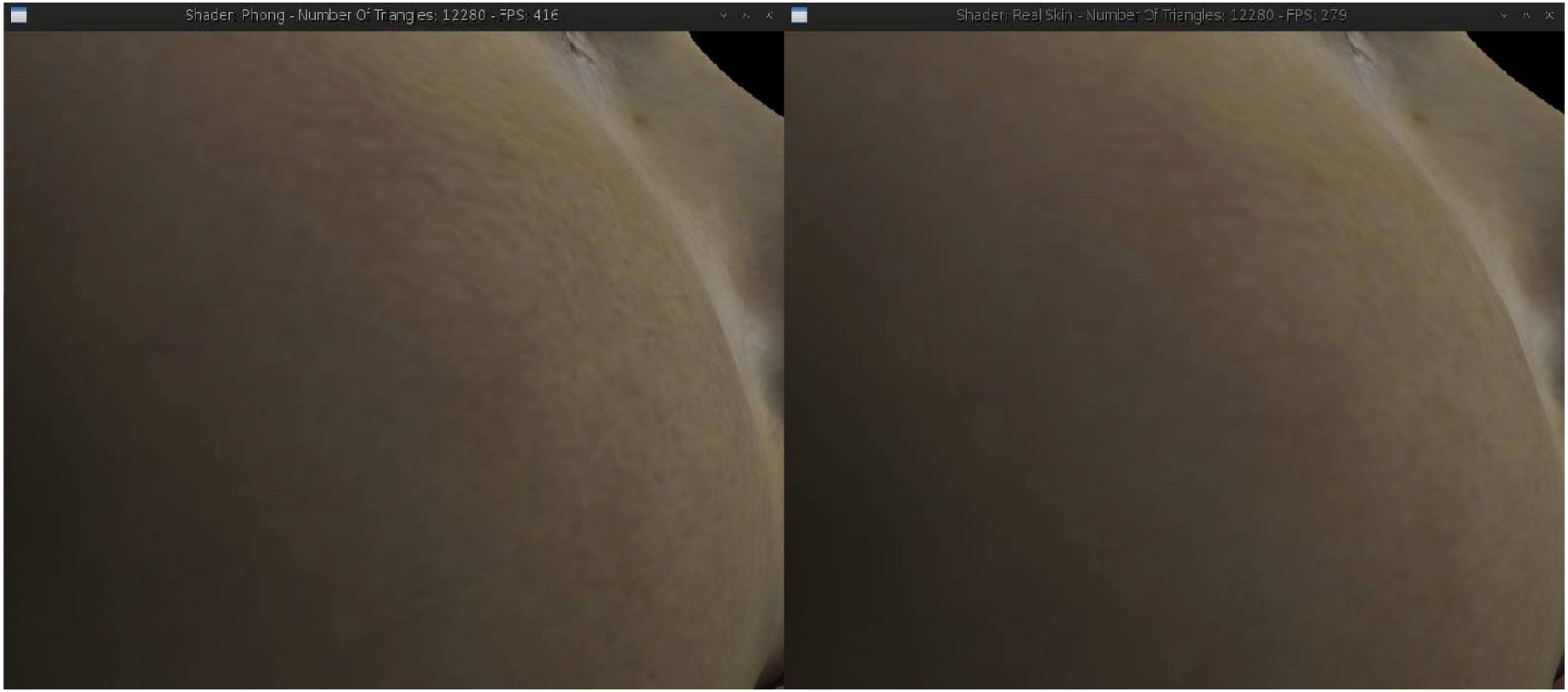
Shader: Real Skin - Number Of Triangles: 12280 - FPS:


Shader: Phong - Number Of Triangles: 12280 - FPS: 282
Shader: Real Skin - Number Of Triangles: 12280 - FPS: 281


Shader: Phong - Number Of Triangles: 12280 - FPS: 416
Shader: Real Skin - Number Of Triangles: 12280 - FPS: 279