(eq 13)

$$G_1(\omega_i, \omega_m) = H(\langle \omega_i, \omega_m \rangle) \min\left[1, \frac{\langle \omega_i, \omega_g \rangle}{\exp(\omega_i) + a_t(\omega_i)}\right]$$

↙ FUNCTION OF MICROFACETS VISIBLE FROM ω_i WITH NORMAL ω_m

$$= H(\langle \omega_i, \omega_m \rangle) \min\left[1, \frac{\langle \omega_i, \omega_g \rangle}{\frac{\langle \omega_i, \omega_p \rangle}{\langle \omega_p, \omega_g \rangle} + \frac{\langle \omega_i, \omega_t \rangle \sqrt{1 - \langle \omega_p, \omega_g \rangle^2}}{\langle \omega_p, \omega_g \rangle}}\right]$$

$$= H(\langle \omega_i, \omega_m \rangle) \min\left[1, \frac{\langle \omega_p, \omega_g \rangle \langle \omega_i, \omega_g \rangle}{\langle \omega_i, \omega_p \rangle + \langle \omega_i, \omega_t \rangle \sqrt{1 - \langle \omega_p, \omega_g \rangle^2}}\right]$$

↙ HEAVISIDE STEP FUNCTION

$$\langle \omega_p, \omega_g \rangle = \cos(\sphericalangle(\omega_p, \omega_g))$$

$$\langle \omega_i, \omega_g \rangle = \cos(\sphericalangle(\omega_i, \omega_g))$$

$$\langle \omega_i, \omega_p \rangle = \text{dot}(\omega_i, \omega_p)$$

$$\langle \omega_i, \omega_t \rangle = \text{dot}(\omega_i, \omega_t)$$

$\sqrt{1 - \cos^2\theta} = \sin\theta$

$\theta = \sphericalangle(\omega_p, \omega_g)$

IMPLEMENTATION

return min(1, max(0, cosTheta(ω_g)) * max(0, cosTheta(ω_p)) / dot(ω, ω_p) + dot(ω, ω_t) * sinTheta(ω_p))

ω_t = VEC(-ω_p.x, -ω_p.y, 0.0)