

2.7: Surfaces - Hemispherical Albedo

Also known as the *directional hemispherical reflectance*, the hemispherical albedo ρ refers to a point on a reflecting surface, and is defined as the ratio of the exitance M to the irradiance E , so that

$$\rho(\mu_0, \varphi_0) = \frac{M}{E(\mu_0, \varphi_0)}, \quad (2.7.1)$$

and in terms of the BRDF, we have

$$\rho(\mu_0, \varphi_0) = \int_0^{2\pi} \int_0^1 f_r(\mu, \varphi; \mu_0, \varphi_0) \mu d\mu d\varphi. \quad (2.7.2)$$

Unlike the single scattering albedo, ρ and the other albedos that we will encounter do not necessarily have in principle a maximum possible value of unity. (See *A Brief History of the Lommel-Seeliger Law*). The scattering properties of the surfaces that we have studied so far are summarised in Table I, from which, for the Lommel-Seeliger law, it can be seen that the maximum possible value for ρ is $\frac{1}{2}$ and 0.125 for the normal albedo.

Table I. Properties of Surfaces

	Lambertian	Lommel-Seeliger
f_r	ϖ_0/π	$\frac{\varpi_0}{4\pi} \frac{1}{\mu_0 + \mu}$
ρ	ϖ_0	$\frac{\varpi_0}{2} [1 - \mu_0 \ln(1 + 1/\mu_0)]$
p_n	ϖ_0	$\frac{\varpi_0}{8}$

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