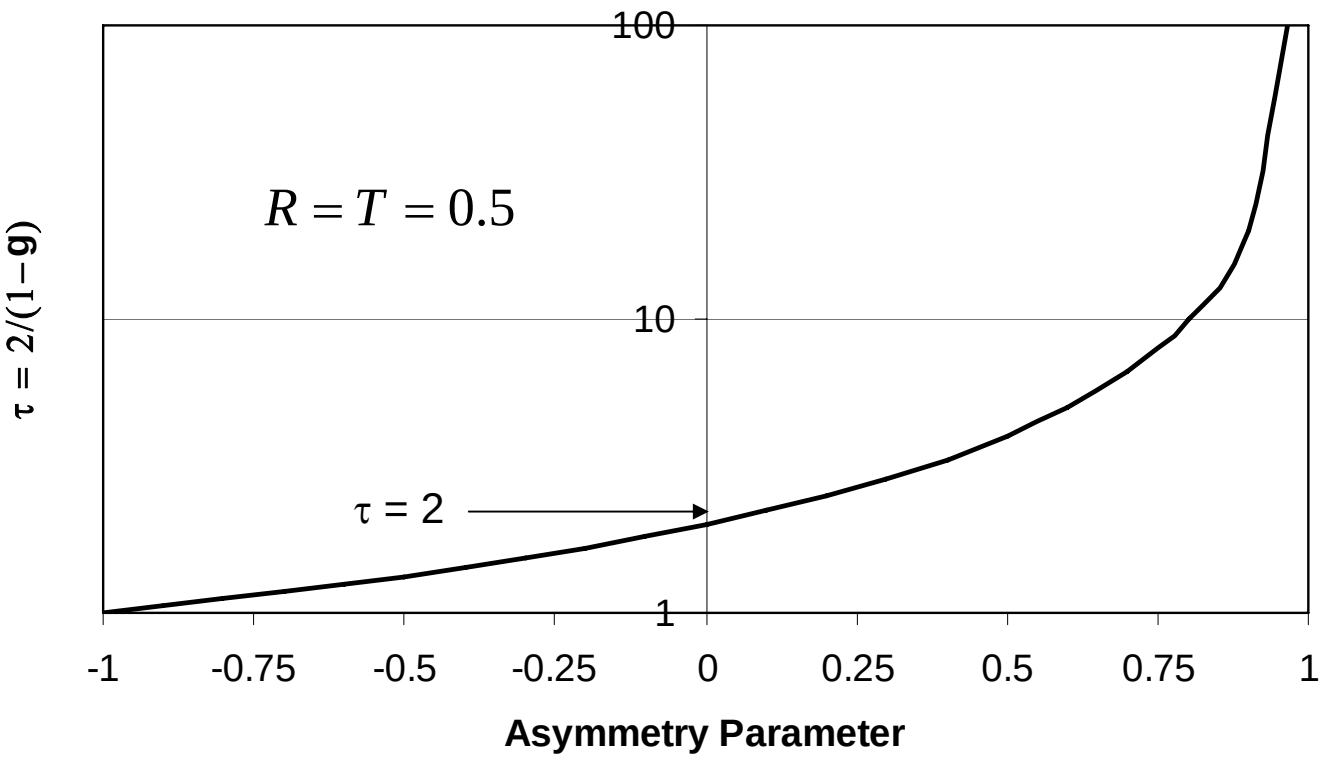
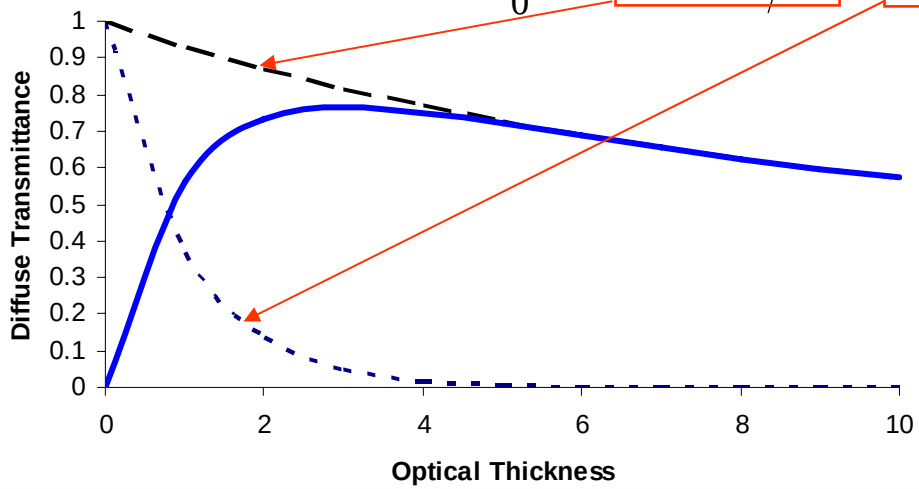
At what optical thickness does: $R = T = \dfrac{\bar{\tau}(1-g)/2}{1+\bar{\tau}(1-g)/2} = \dfrac{1}{1+\bar{\tau}(1-g)/2}$?

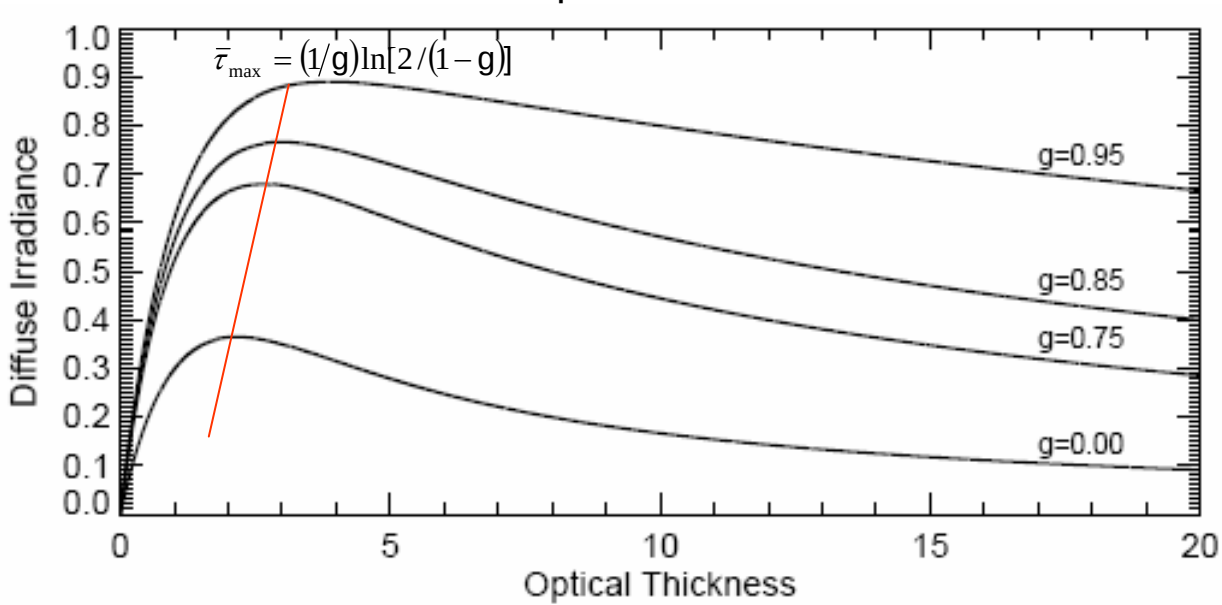
$$\bar{\tau} = 2/(1-g)$$



Diffuse Radiation

Diffuse irradiance ***beneath*** a cloud: $\frac{D_{\downarrow}}{F_0} = \frac{1}{1+\bar{\tau}^*/2} - \exp(-\bar{\tau})$



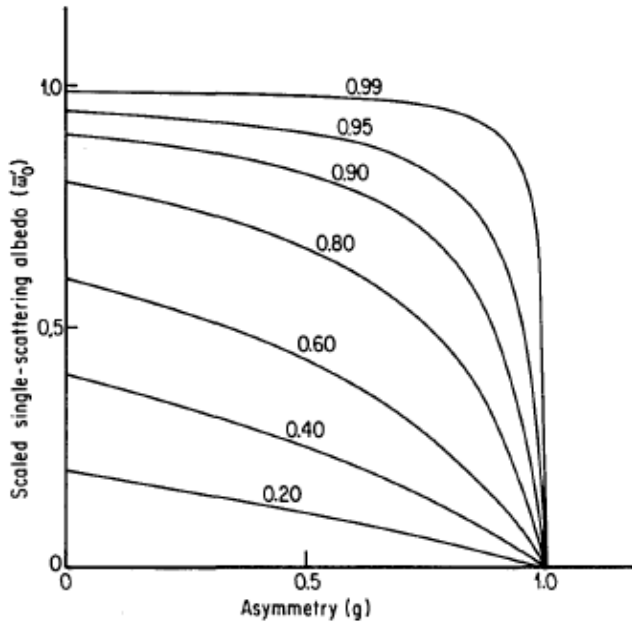


Darkening upon wetting

- Why does sand darken upon wetting?
  - For fixed absorption we know that reflectance decreases with increasing forward scattering
- We can define a “scaled” single scattering albedo, just as define a scaled optical depth for the conservative scattering case:

$$\varpi' = \frac{(1-g)\varpi}{1-g\varpi}$$

same reflectance (and absorption), differ pair of ϖ,g.



Darkening upon wetting

- How does angular dependence of particle scattering change with the refractive index of the medium?
  - Closer the refractive index of the medium is to that of the particle the more highly peaked the forward scattering → larger g
- Increased forward scattering increases absorption of layer, decreases reflectance