Lecture 4* Inherent optical properties, part I

What properties of a medium affect the radiance field as it propagate through it?

- 1. Sinks of photons (absorbers)
- Sources of photons (internal sources)
 Redirectors of photons (scatterers)

*based, in part, on a lecture prepared by C. Roesler





























What is scattering:

Matter is composed of diecrete electric charges which are excited by an oscillating EM field (light). When excited they emit EM waves. Elastic (coherent) scattering- same frequency as the source.

Scattering refers also to the redirection of energy of an 'infinite' 'planeparallel' electro-magnetic wave due to interaction with matter. By interaction we mean that the wave travels at different speed at different location within the medium due to inhomogeneities within the medium. Such inhomogeneities may be caused by particles of different optical properties within the medium or 'fluctuations', regions within the medium that have slightly different concentrations of molecules.

The 'relative' index of refraction (n_r) of a particle relative to the medium in which it is embedded, is the ratio of the speeds of lights: $n_p=c_{medium}/c_p$.

For a given size and shape of a particle in a medium, the more different the index of refraction is from 1 the more pronounce is the scattering.



From: http://www.cs.ucl.ac.uk/staff/S.Bhatti/D51-notes/img229.gif















