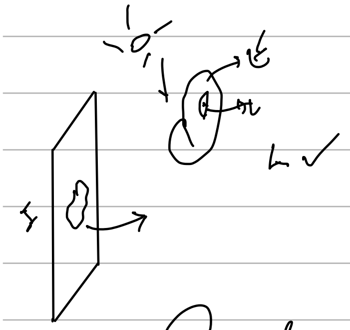
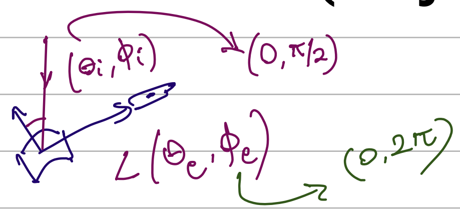
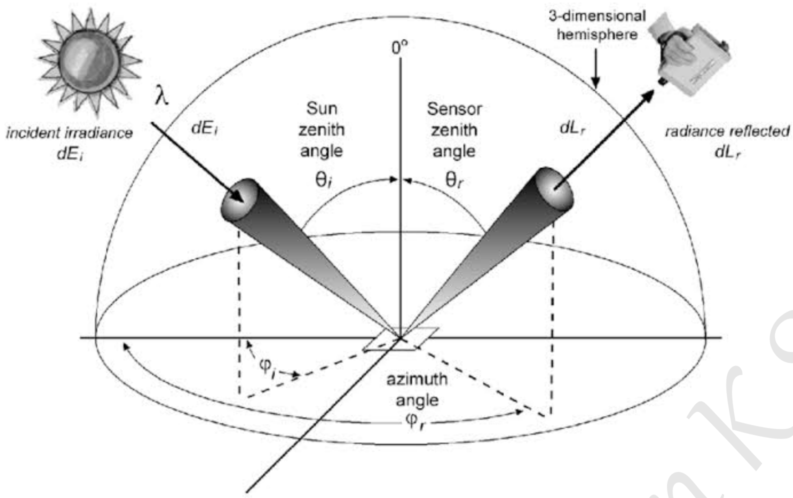
EE702: Lec-4 (17 Jan)





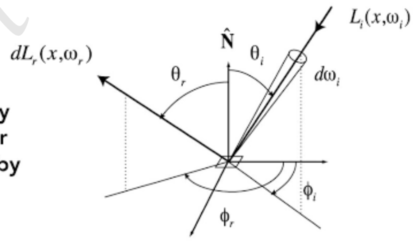
Bi-directional Reflectance Distribut^n F^n (BRDF)

$$f(\theta_i, \phi_i, \theta_e, \phi_e) = \frac{\partial L(\theta_e, \phi_e)}{\partial E(\theta_i, \phi_i)}$$



BRDF

Definition: The bidirectional reflectance distribution function (BRDF) represents how much light is reflected into each outgoing direction ω_r from each incoming direction



NB: ω_i points away from surface rather than into surface, by convention.

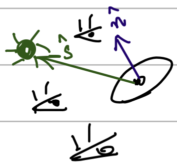
$$f_r(\omega_i \to \omega_r) = \frac{dL_r(\omega_r)}{dE_i(\omega_i)} = \frac{dL_r(\omega_r)}{L_i(\omega_i)\cos\theta_i \, d\omega_i} \left[\frac{1}{sr}\right]$$

CS184/284A — Ren Ng

Case: Specular surface (mirror-like)

$$f = k \cdot \delta(\theta_i - \theta_e) \cdot \delta(\phi_i - \phi_e - \pi)$$

Lambertian Surface



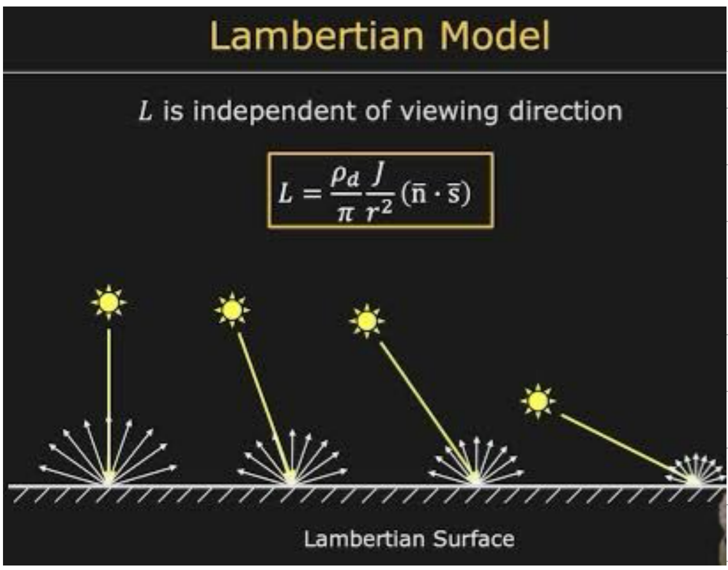
$f(\ldots) = \text{CONSTANT}$

$E(x, y) = k \cos\theta$ $\rightarrow \hat{n} \cdot \hat{s}$

$\Rightarrow E(x, y) = \hat{n}(x, y, z) \cdot \hat{s}(\quad)$

surface normal at a point on the object

$$\hat{s} = \frac{((x_s - x), (y_s - y), (z_s - z))}{\|norm\|}$$



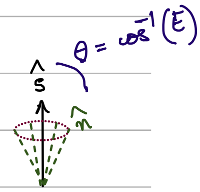
Sravan K Suresh
22B3936

Assumptions: 1] S is far away from object ($\hat{s}$ is fixed for entire surface)

2] Orthographic projection (object is far from centre)

$E(x,y) = \hat{n}(x,y) \cdot \hat{s}$

$\hookrightarrow$ same $\forall (x,y)$ on surface (by assumption 1)



Problem: $E, \hat{s} \rightarrow$ known ; $\hat{n} = ?$

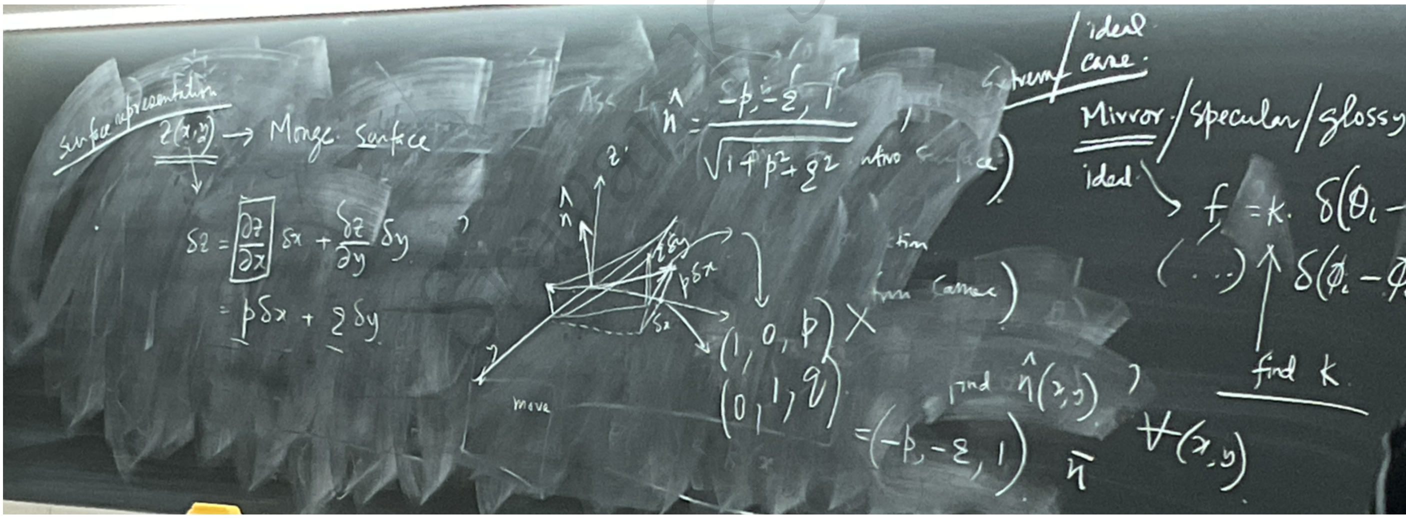
$\hat{n}$ is 2-dimensional ! $\therefore$ 2 unknowns, one eqn.

Surface Approximation

$z(x,y) \longrightarrow$ Monge surface

$$\delta z = \frac{\partial z}{\partial x}\delta x + \frac{\partial z}{\partial y}\delta y$$

$$= p\,\delta x + q\,\delta y$$



Sravan K Suresh
22B3936