EECS101 Discussion 6

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Solid Angle

- $\Omega = \dfrac{A\cos\theta}{R^2}$

  ◦ where A is the area of the surface
  ◦ θ is the angle between the surface normal and the line connecting the surface center and the view point
  ◦ R is the line length

  ◦ The difference between a sphere and a plane is their normal where the sphere normal is always parallel to the viewing direction while the plane normal is not

Surface Gradient

- Define a surface with z(x,y)
- Surface gradient *(p,q)*

$$p = \frac{dz}{dx}, q = \frac{dz}{dy}$$

- Surface normal $n = (-p, -q, 1)$

Reflectance Map

- $R(p, q) \in [0,1]$
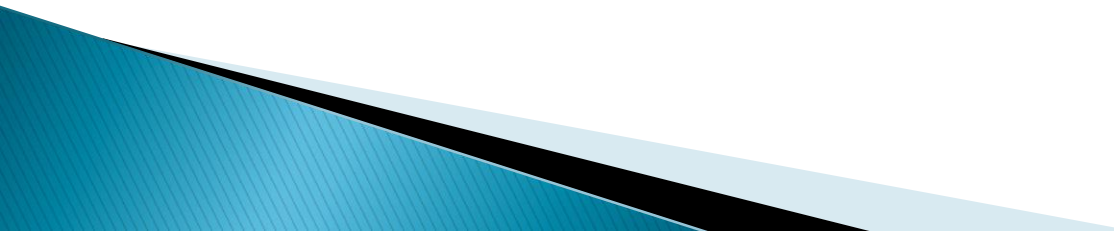
  - Lambertian surface illuminated by collimated source
  $$R(p, q) = \frac{1 + p_s p + q_s q}{\sqrt{1 + p_s{}^2 + q_s{}^2}\sqrt{1 + p^2 + q^2}}$$

  Source gradient: (ps,qs)

  - Image irradiance equation:
  $$E(x, y) = R(p, q)$$

Gradient plane

- (p,q) plane

- The gradients of two intersecting planes lie along a line in gradient space that is perpendicular to the line of intersection of the planes in the image.

- Condition: orthographic projection

Submission Guideline

HW6: turn in your paper work in lab or submit your homework to EEE by Feb 24 midnight

HW5: demonstrate your program by 3pm, Feb 24, in lab. Submit your homework to EEE by Feb 24.

HW6 Grading Criteria

- Total 100 points
  - 25 points for each problem