

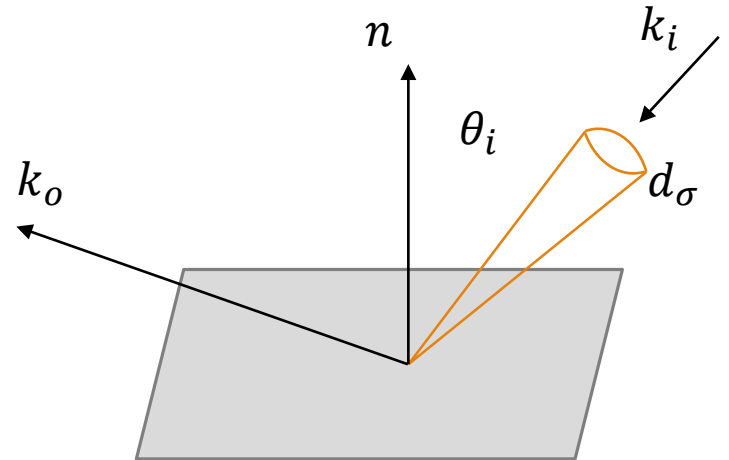
CT5202: Photorealistic Rendering

Light Transport Equation

BOCHANG MOON

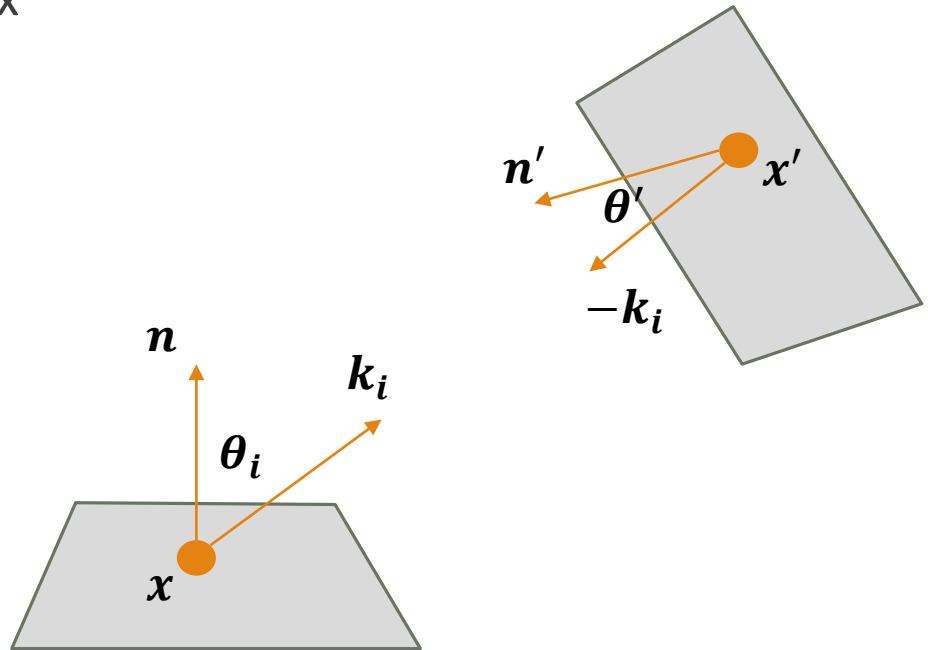
Transport Equation

- $L_S(k_o) = \int_{all\ k_i} \rho(k_i, k_o) L_f(k_i) \cos\theta_i d\sigma_i$
 - $L_f(k_i)$: field radiance from k_i direction
 - $L_S(k_o)$: surface radiance measured in k_o direction
 - *Rendering equation* [Immel, Cohen & Greenberg, 1986]
 - We can also write the equation with surface radiances only [Kajiya, 1986]



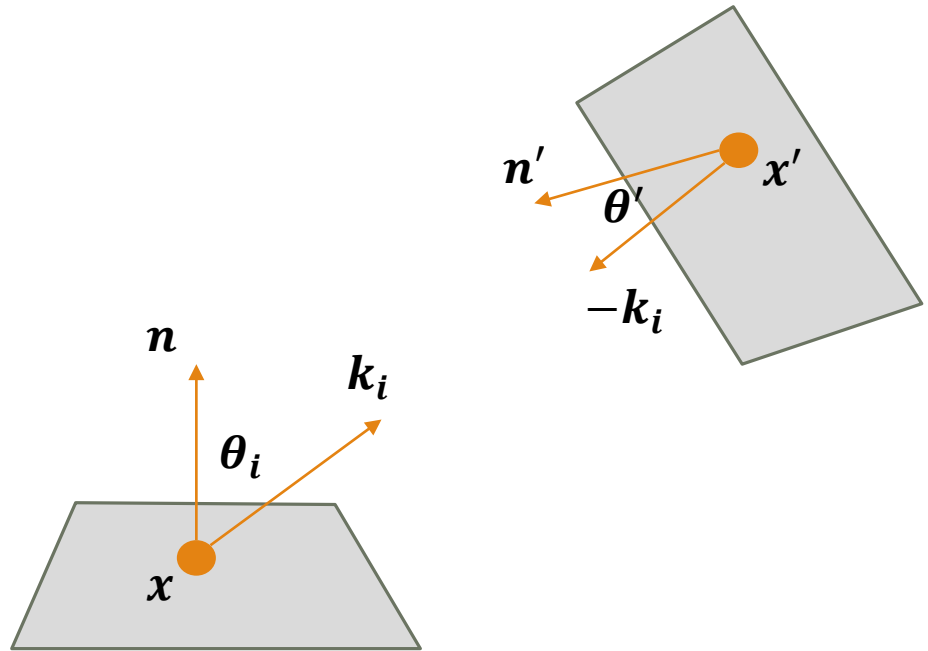
Transport Equation

- $L_S(k_o) = \int_{all\ k_i} \rho(k_i, k_o) L_f(k_i) \cos\theta_i d\sigma_i$
- $L_S(-k_i) = L_f(k_i)$
- Solid angle subtended by the point x'
 - Area on a unit sphere
 - $\Delta\sigma_i = \frac{\Delta A' \cos\theta'}{||x-x'||^2}$
 - $\Delta A'$ is the area associated with x'
- Differential solid angle
 - $d\sigma_i = \frac{dA' \cos\theta'}{||x-x'||^2}$



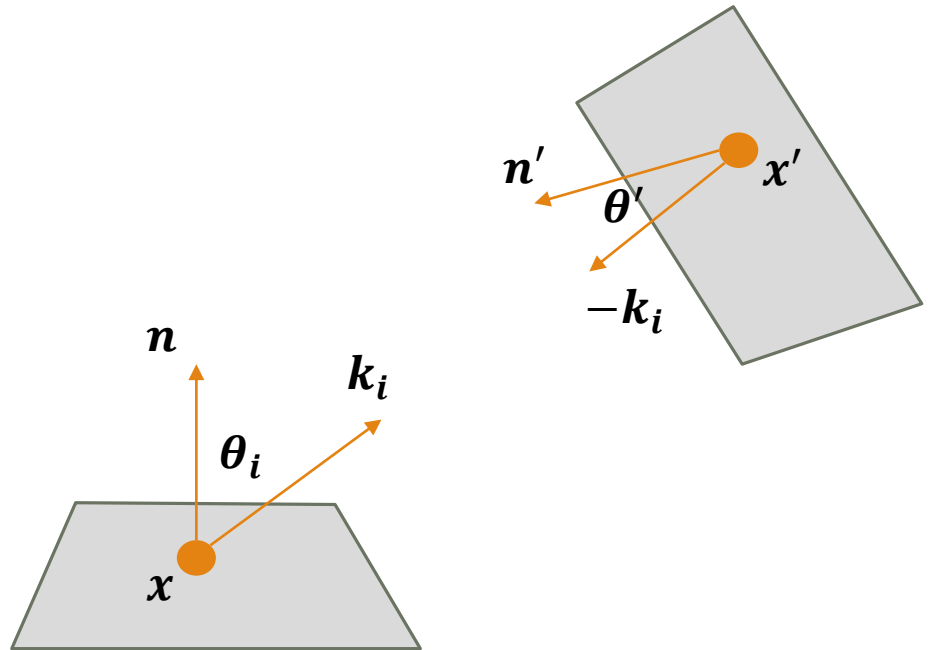
Transport Equation

- $L_S(k_o) = \int_{\text{all } x' \text{ visible to } x} \frac{\rho(k_i, k_o) L_S(x', x-x') \cos\theta_i \cos\theta'}{\|x-x'\|^2} dA'$



Transport Equation

- $L_S(k_o) = \int_{all\ x'} \frac{\rho(k_i, k_o) L_S(x', x-x') v(x, x') \cos\theta_i \cos\theta'}{\|x-x'\|^2} dA'$
 - Rendering equation [Kajiya, 1986]
 - $v(x, x')$: visibility function
 - 1 if x and x' are mutually visible
 - 0 otherwise



Paper Presentation & Project

- Each student should select an interesting problem, which is related to this course
 - Present two papers (20 min. presentation + 20 min. Q&A)
 - Nov. 7, Nov. 12, Nov. 14 for the first round
 - Nov. 26, Nov. 28, Dec. 03 for the second round
 - Perform a term project which includes the following:
 - Proposal presentation (10 min. presentation + 10 min. Q&A)
 - Explain the problem, related work, your idea, implementation plan
 - Nov. 19 and 21
 - Final presentation (15 min. presentation + 10 min. Q&A) & technical report (4 pages)
 - Explain the problem, related work, a concrete idea, experimental results, future work
 - Dec. 5 and 10