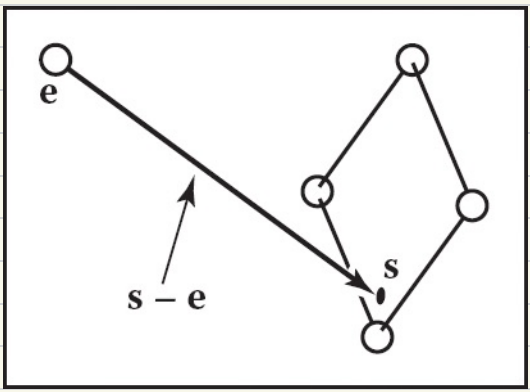
Chapter 4 - Ray Tracing

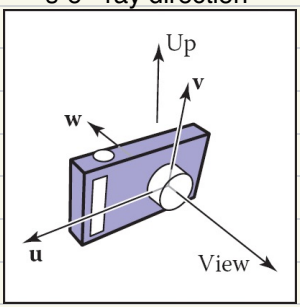
3. Computing Viewing Rays



ray: p(t) = e + t(s-e)

e - ray origin

s-e - ray direction



3.1. Orthographic Views

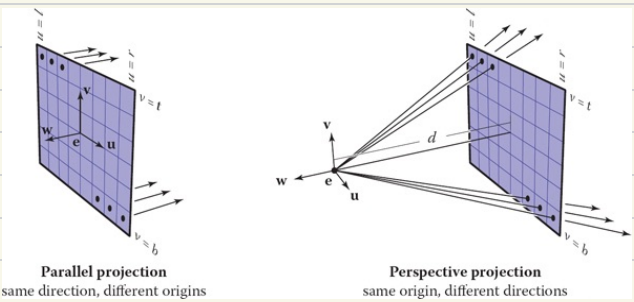
rays in the -w direction

u,v - perpendicular to w

3.2. Perspective Views

rays - same origin

direction - similar to focal



4. Ray-Object Intersection

4.1. Ray-Sphere Intersection

ray - p(t) = e + td

surface - f(p) = 0

f(p(t)) = f(e+td) = 0

sphere: (x-xc)^2 + (y-yc)^2 + (z-zc)^2 - R^2 = 0 or (p-c)^2 - R^2 = 0

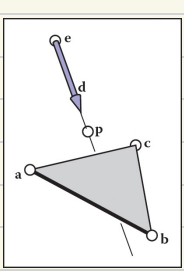
(e+td-c)^2 - R^2 = 0

(d.d) t^2 + 2d (e-c) t + (e-c)(e-c) - R^2 = 0

4.2. Ray-Triangle Intersection

e+td=f(u,v)

e+td = a + β(b-a) + γ(c-a)



4.3. Ray-Polygon Intersection

polygon with m vertices p1-pm, surface normal n

(p-p1)n=0

t = (p1-e) . n / d . n

4.4. Intersecting a Group of Objects

intersect closest

Chapter 13 - More Ray Tracing

4. Distribution Ray Tracing

4.1. Antialiasing

compute average colour for area of pixel rather than center point value

4.2. Soft Shadows