Fog

CSCI 4229/5229
Computer Graphics
Summer 2020

Justification

- Light is distorted with distance
  - Fog, haze, smoke, snow, dust, suspended particles and pollution limits visibility
  - Turbulence and other thermally driven effects cause refraction and distortion
- Primarily applies to outside scenes
  - Critical under water and during precipitation
  - Smoke filled room indoor example

Implementation in Computer Graphics

- Blend object color with background color
  - More of background with greater distance
  - Distance measured from observer
  - Transition with distance generally nonlinear
  - Cutoff distance – objects beyond this are obscured
- Background color typically should match fog color (unless completely covered by objects)

Fog Equations in OpenGL

- $C = f\, C_{obj} + (1-f)\, C_{fog}$
- $f = (d_{end}-d)/(d_{end}-d_{start})$ [limited to 0-1]
- $f = \exp(-\gamma d)$
- $f = \exp(-\gamma^2 d^2)$
  - d is the distance from the observer
  - d_{start} and d_{end} is the range of linear fog
  - γ is the fog density

Fog in OpenGL

- glEnable(GL_FOG)
- glFog*
  - GL_FOG_MODE
    - GL_LINEAR, GL_EXP, GL_EXP2
  - GL_FOG_COLOR (C_{fog})
  - GL_FOG_DENSITY (γ in GL_EXP & GL_EXP2)
  - GL_FOG_START (d_{start} in GL_LINEAR)
  - GL_FOG_END (d_{end} in GL_LINEAR)