

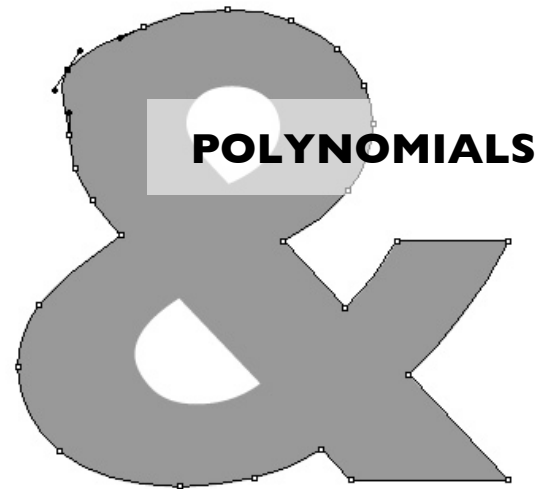
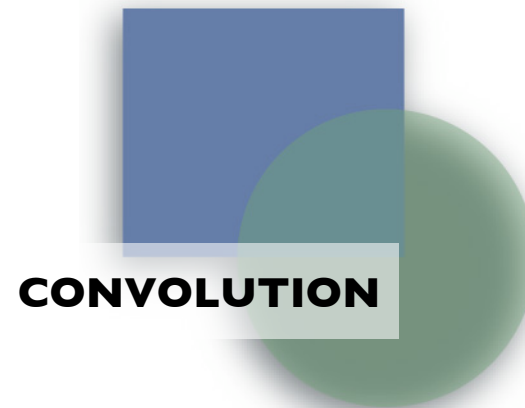
# **CS465:** Computer Graphics I

Professor: Steve Marschner

**Computer graphics:** The study of creating, manipulating, and using visual images in the computer.

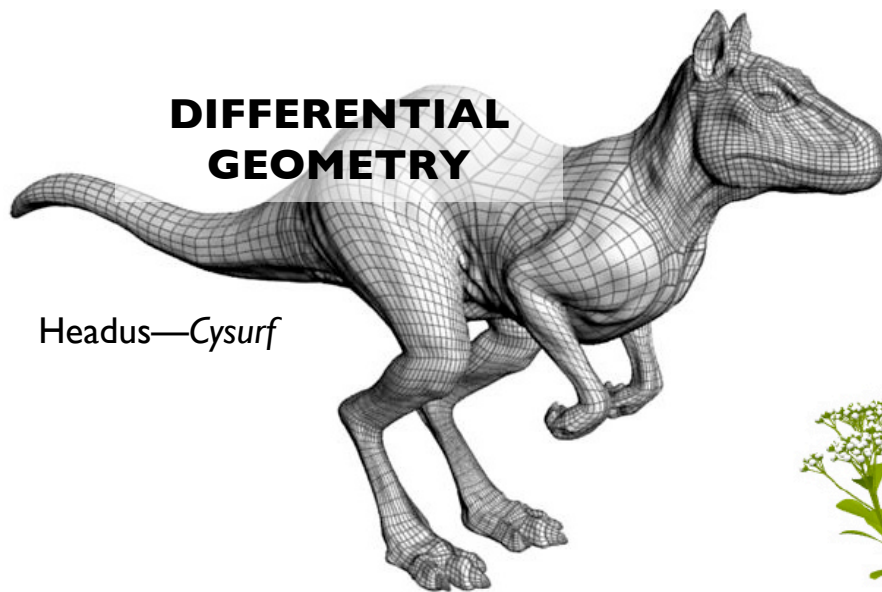
# Problems in graphics

- 2D imaging
  - compositing and layering
  - digital filtering
  - color transformations
- 2D drawing
  - illustration, drafting
  - text, GUIs

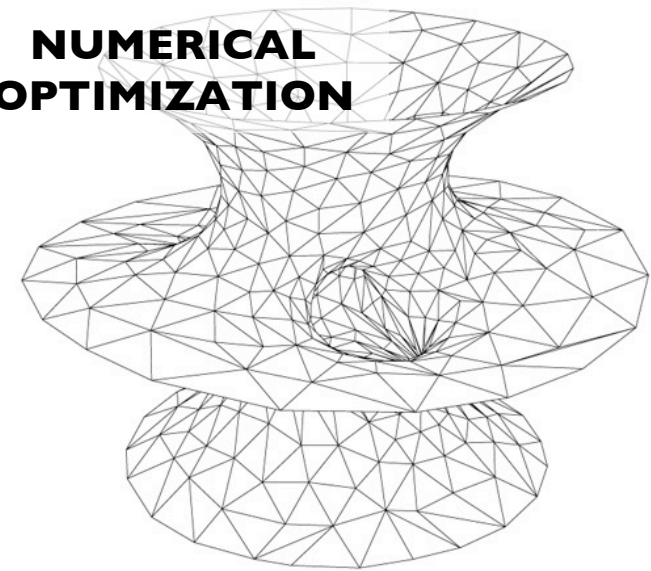


# Problems in graphics CONT'D

- 3D modeling
  - representing 3D shapes
  - polygons, curved surfaces, ...
  - procedural modeling

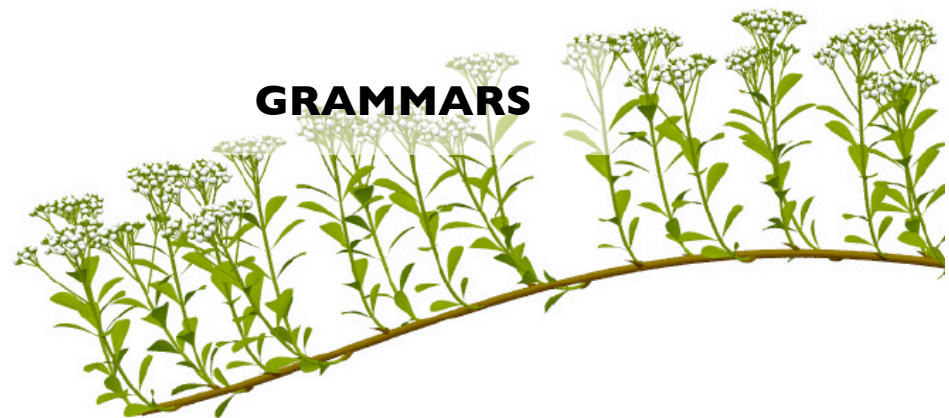


**NUMERICAL OPTIMIZATION**



[Hoppe et al. 1993]

**GRAMMARS**

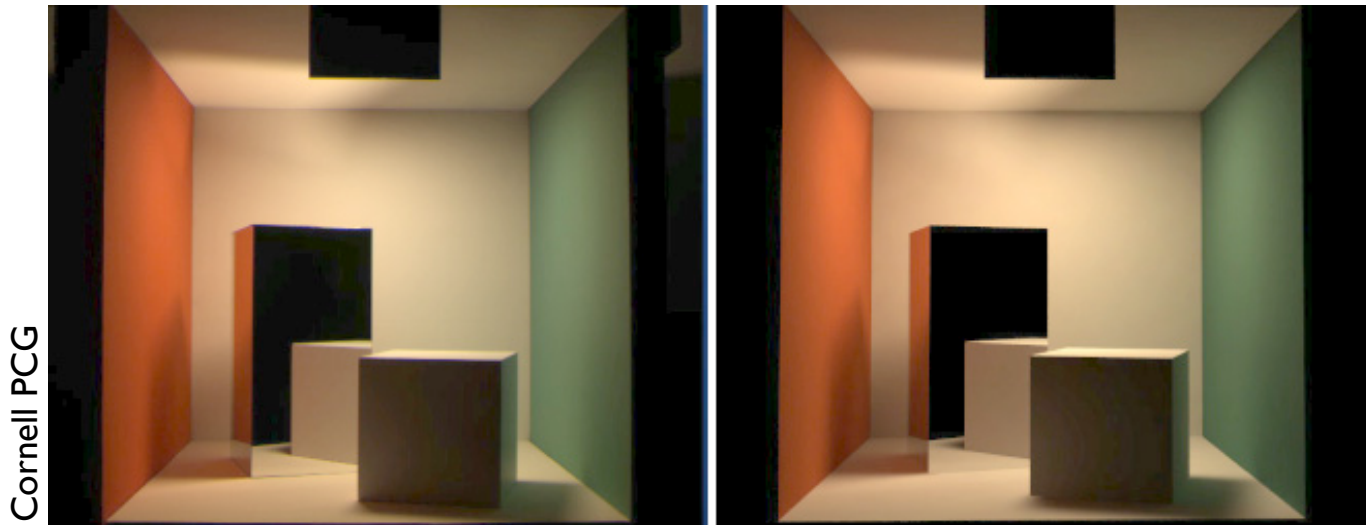
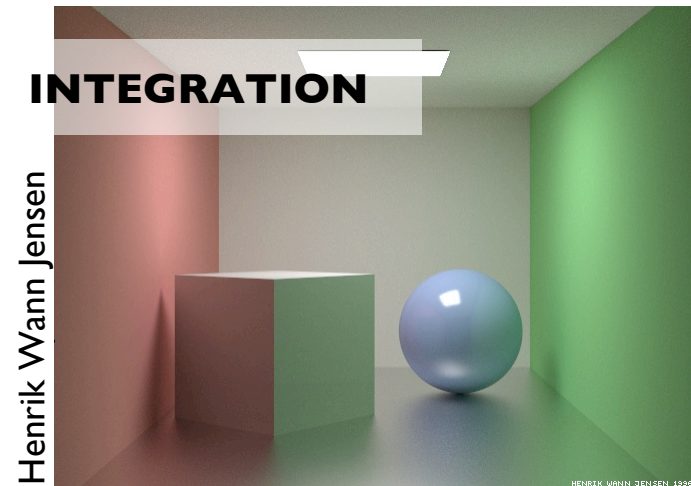


[Prusinkiewicz et al. 2001]

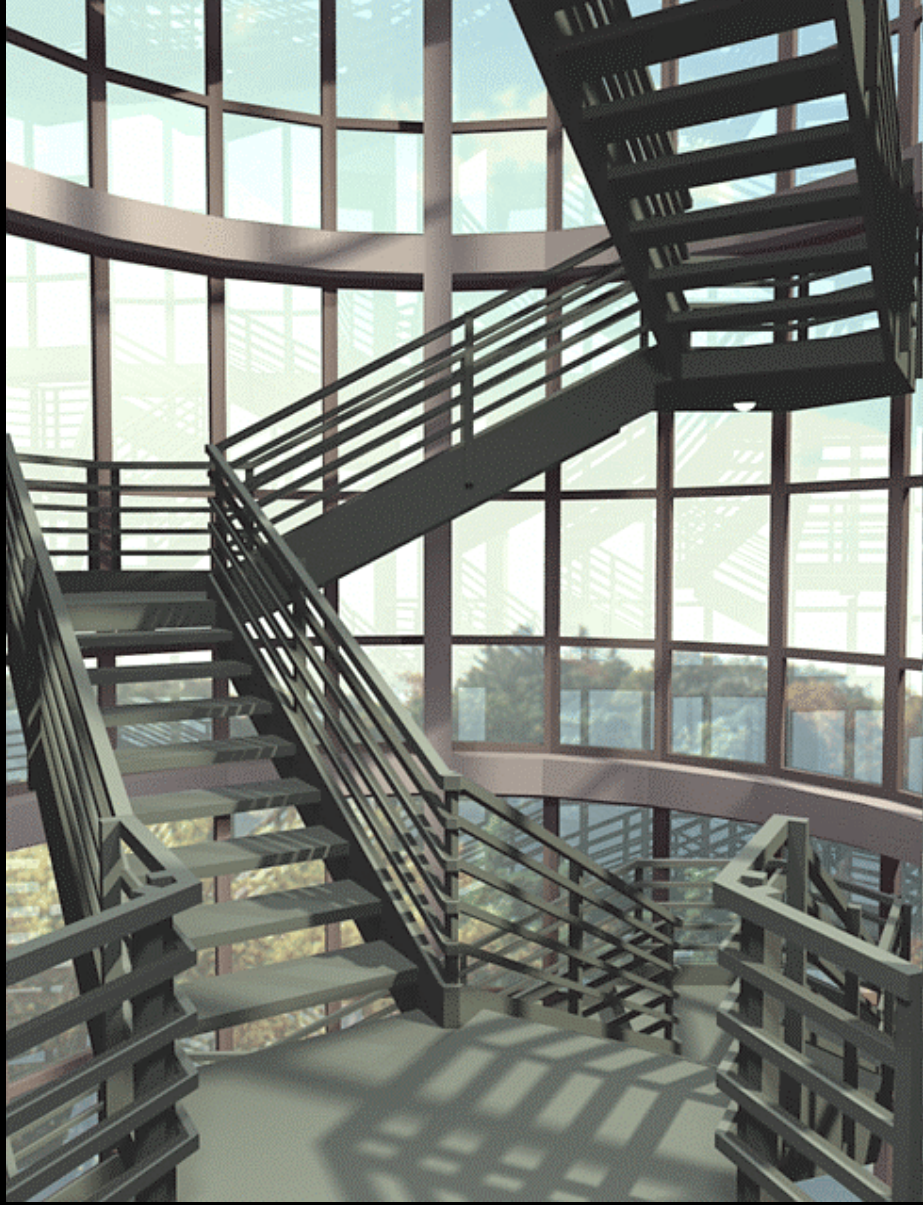


# Problems in graphics CONT'D

- 3D rendering
  - 2D views of 3D geometry
  - projection and perspective
  - removing hidden surfaces
  - lighting simulation



Cornell PCCG



Henrik Wann Jensen

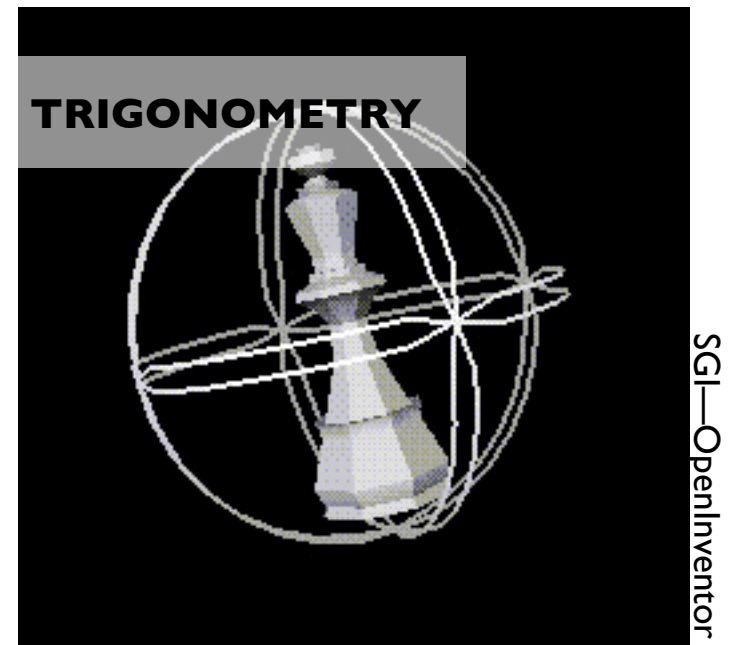


RENDERED USING DALI - HENRIK WANN JENSEN 2000



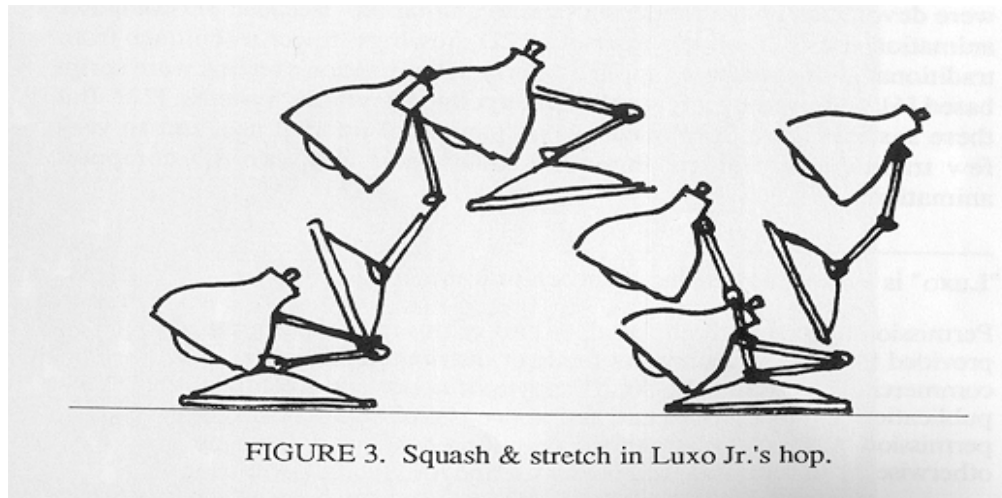
# Problems in graphics CONT'D

- Interaction
  - 2D graphical user interfaces
  - 3D modeling interfaces
  - virtual reality



# Problems in graphics CONT'D

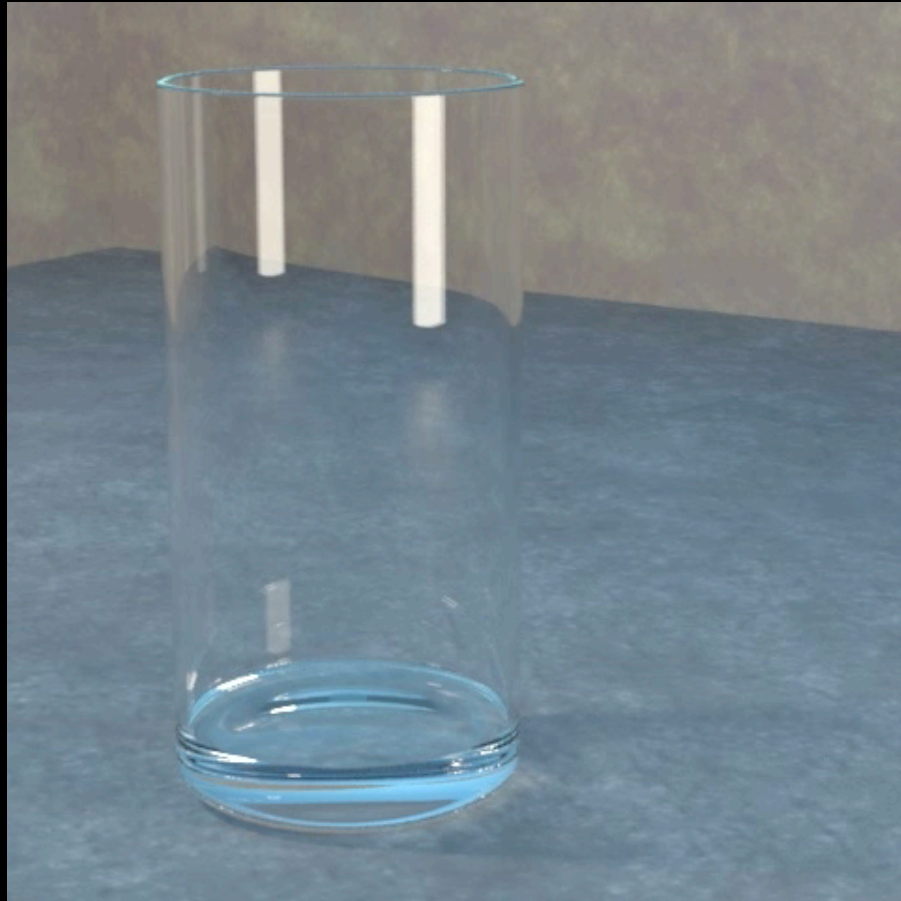
- Animation
  - keyframe animation
  - physical simulation



Pixar

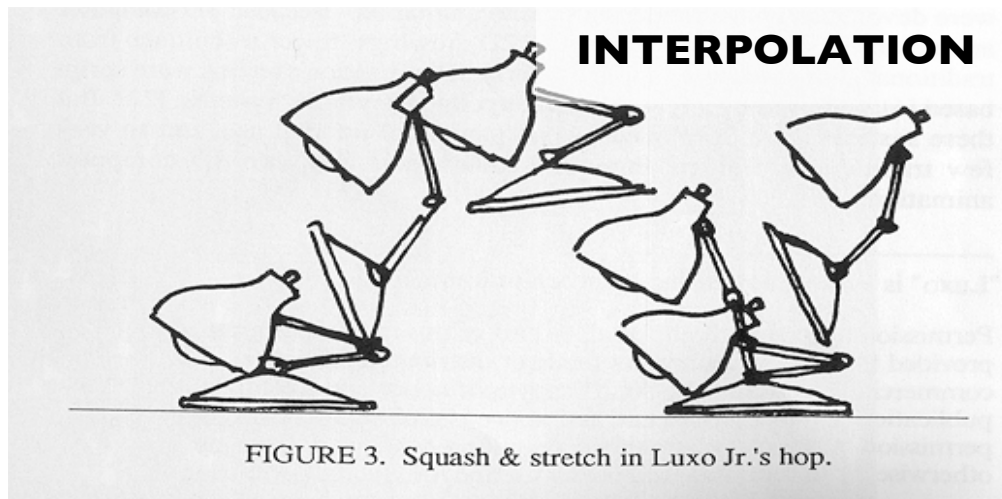


Enright et al. SIGGRAPH 2003

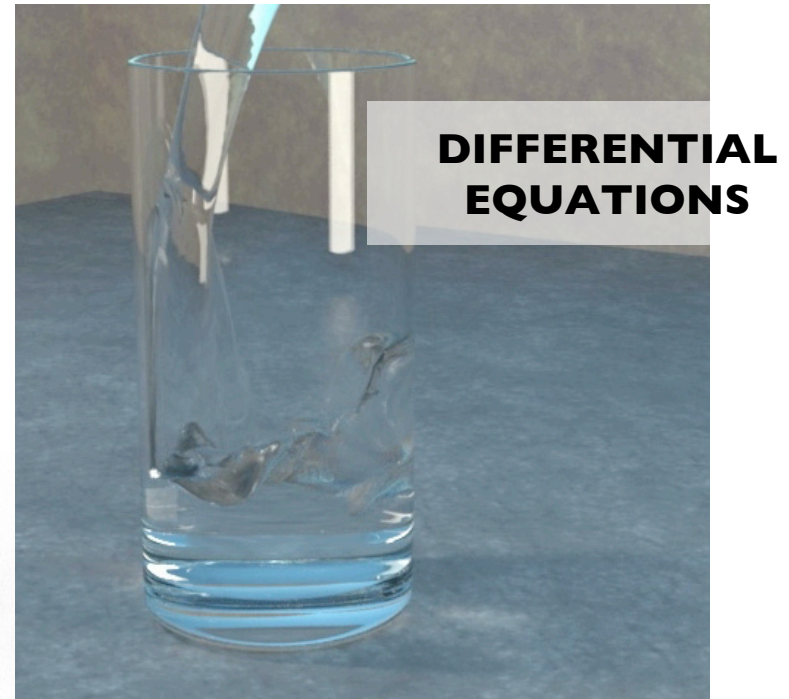


# Problems in graphics CONT'D

- Animation
  - keyframe animation
  - physical simulation



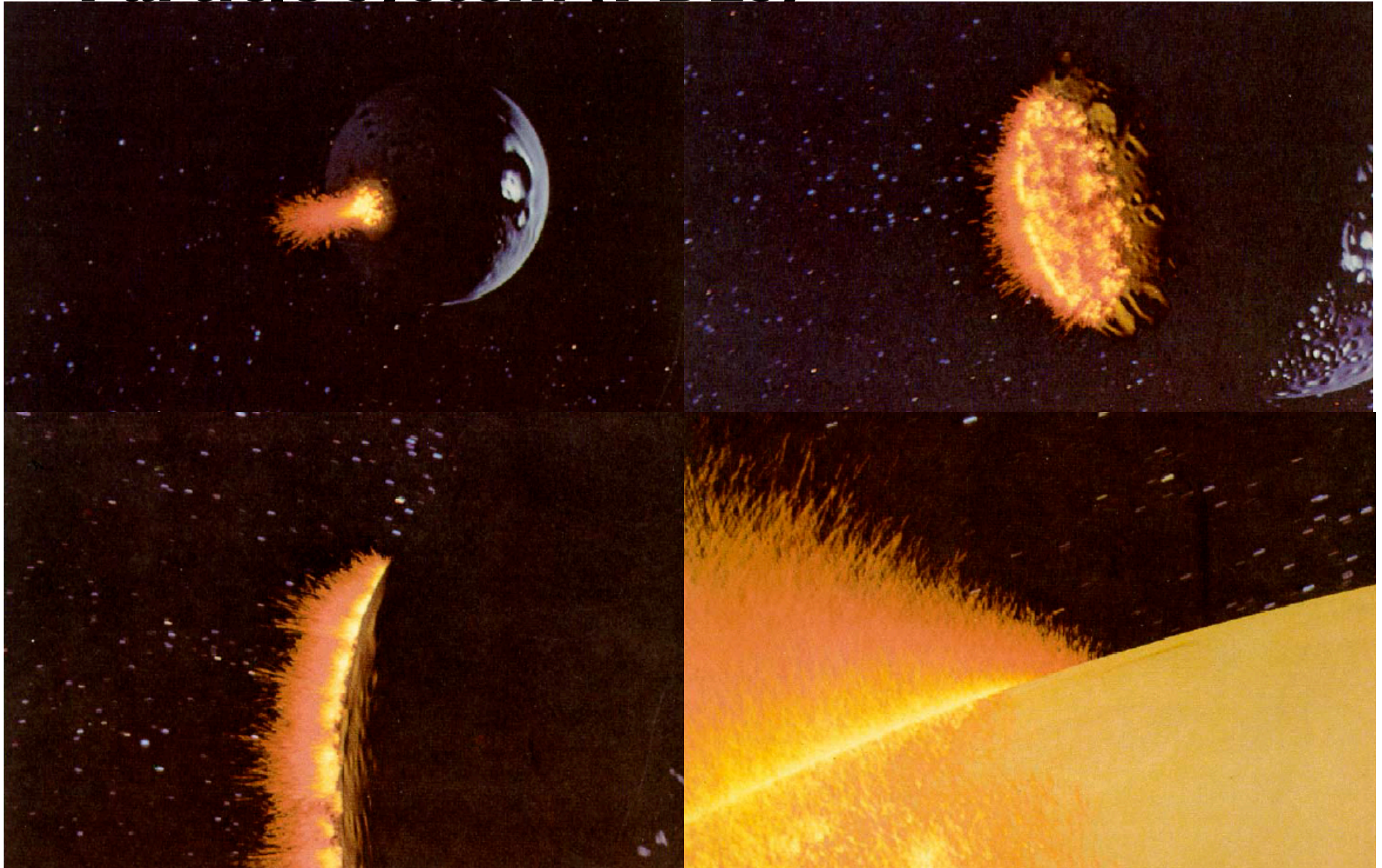
Pixar



Enright et al. SIGGRAPH 2003



# Particle system (PDEs)





# **Computer graphics:** Mathematics made visible.

**Computer graphics:**  
Mathematics made visible  
--- and when that is not  
feasible, approximate it!

# Graphics Applications

- Entertainment
  - film production
  - film effects
  - games



Pixar—*Monsters, Inc.*



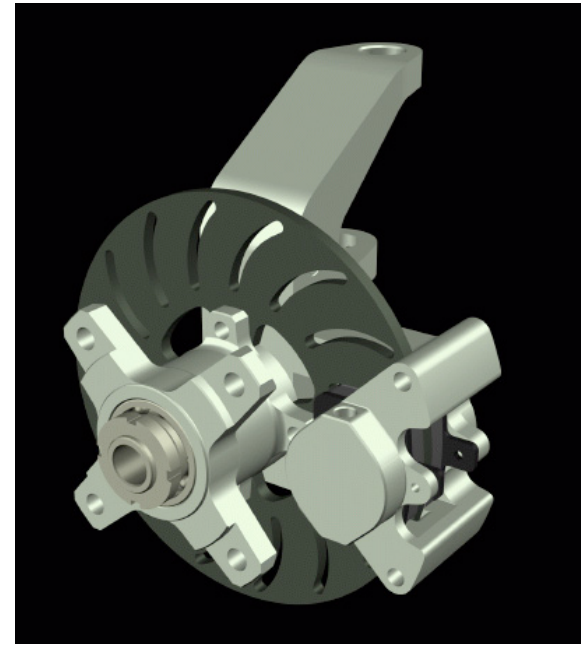
ID Software—*Quake III Arena*



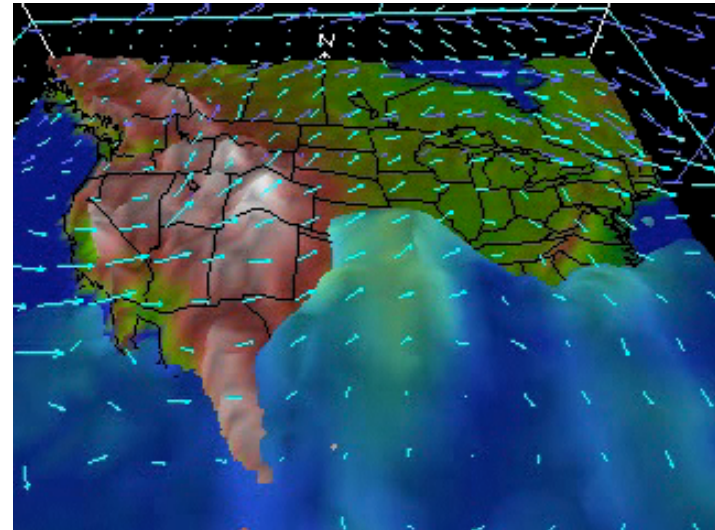
New Line Cinema—*The Two Towers*

# Graphics Applications

- Entertainment
  - film production
  - film effects
  - games
- Science and engineering
  - computer-aided design
  - scientific visualization



U. of Utah—Alpha I

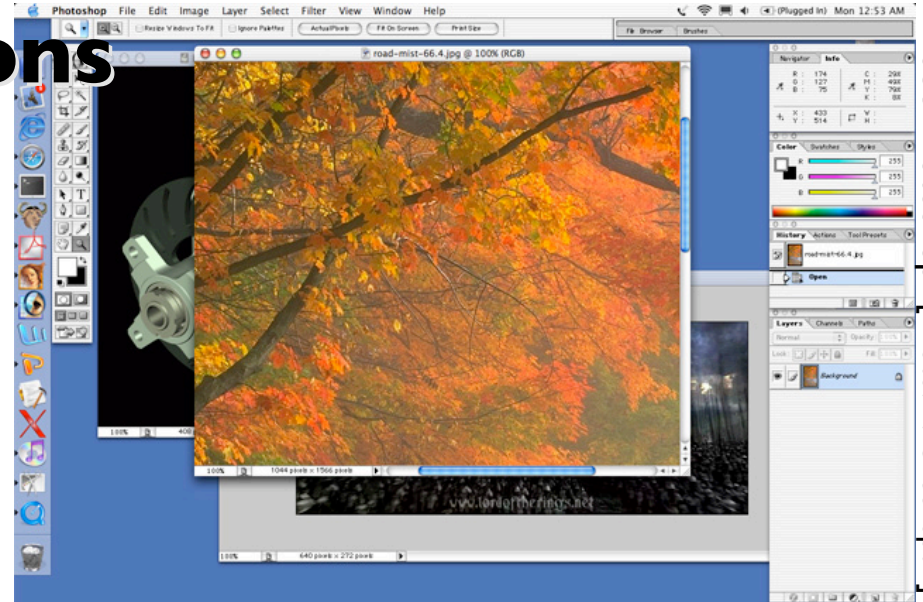


NCSA—Virtual Director

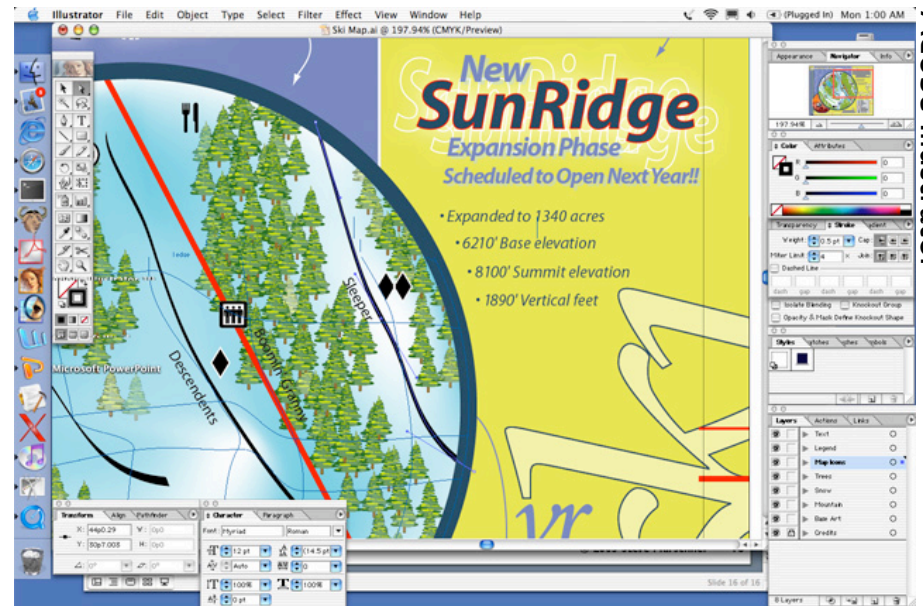


# Graphics Applications

- Entertainment
  - film production
  - film effects
  - games
- Science and engineering
  - computer-aided design
  - scientific visualization
- Graphic Arts



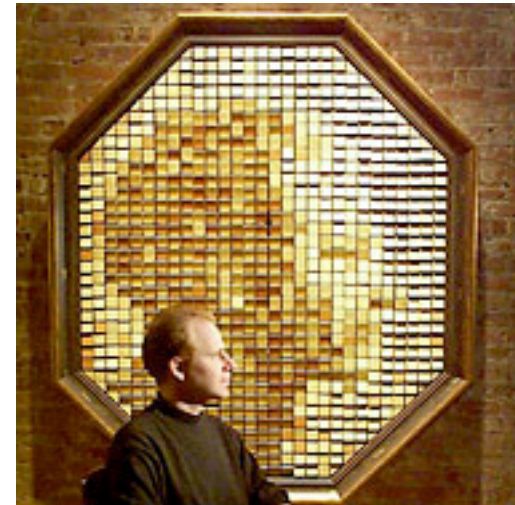
Adobe Photoshop [Photo: P. Greenspun]



Adobe Illustrator

# Graphics Applications

- Entertainment
  - film production
  - film effects
  - games
- Science and engineering
  - computer-aided design
  - scientific visualization
- Graphic Arts
- Fine Arts



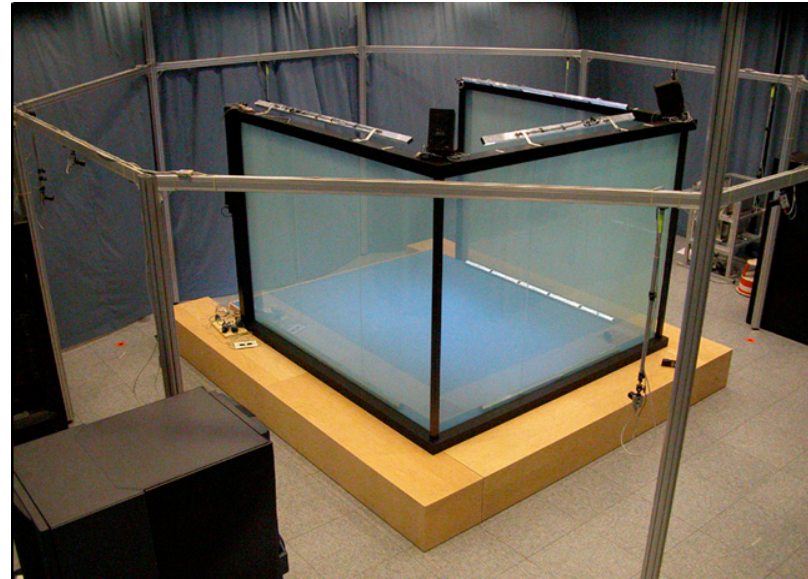
Daniel Rozin—*Wooden Mirror*



Kelly Heaton - *Reflection Loop*

# Graphics Applications

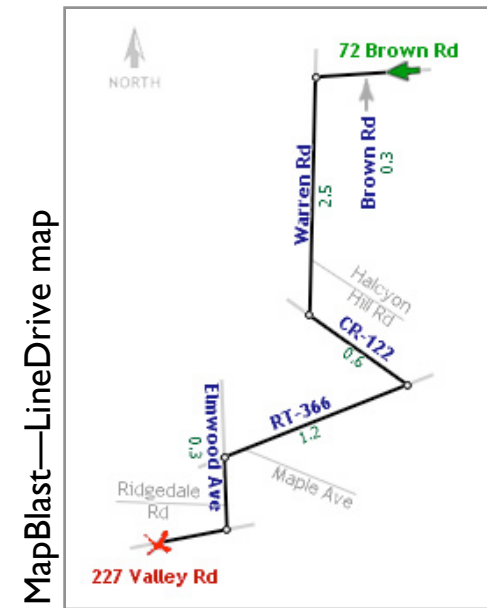
- Entertainment
  - film production
  - film effects
  - games
- Science and engineering
  - computer-aided design
  - scientific visualization
- Graphic Arts
- Virtual Reality





# Graphics Applications

- Entertainment
  - film production
  - film effects
  - games
- Science and engineering
  - computer-aided design
  - scientific visualization
- Graphic Arts
- Fine Arts
- Virtual Reality
- Training & Simulation



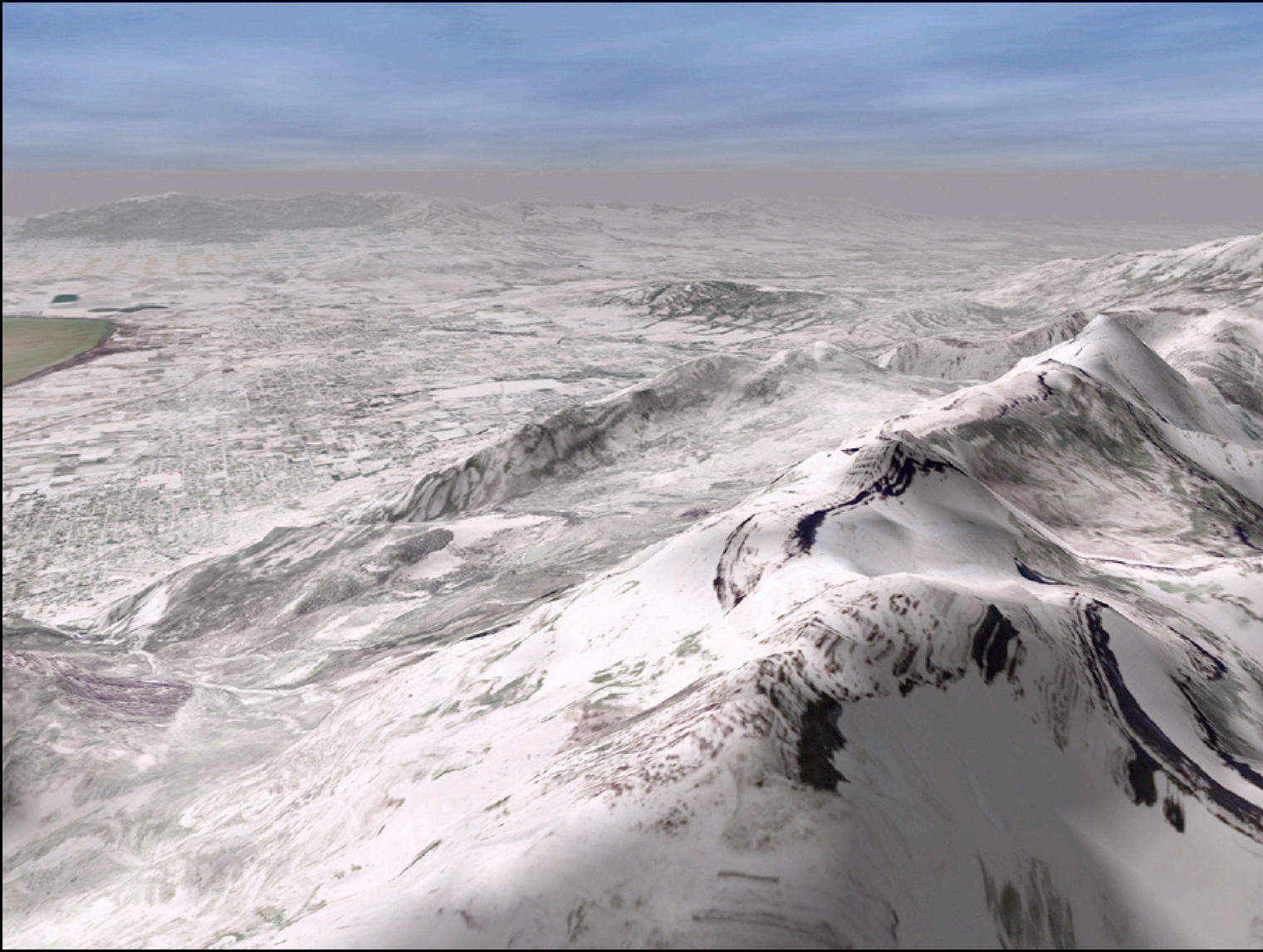
NASA/Ames—ACFS



Evans and Sutherland



Evans and Sutherland





Evans and Sutherland







