Reflected Scene Impostors for Realistic Reflections at Interactive Rates

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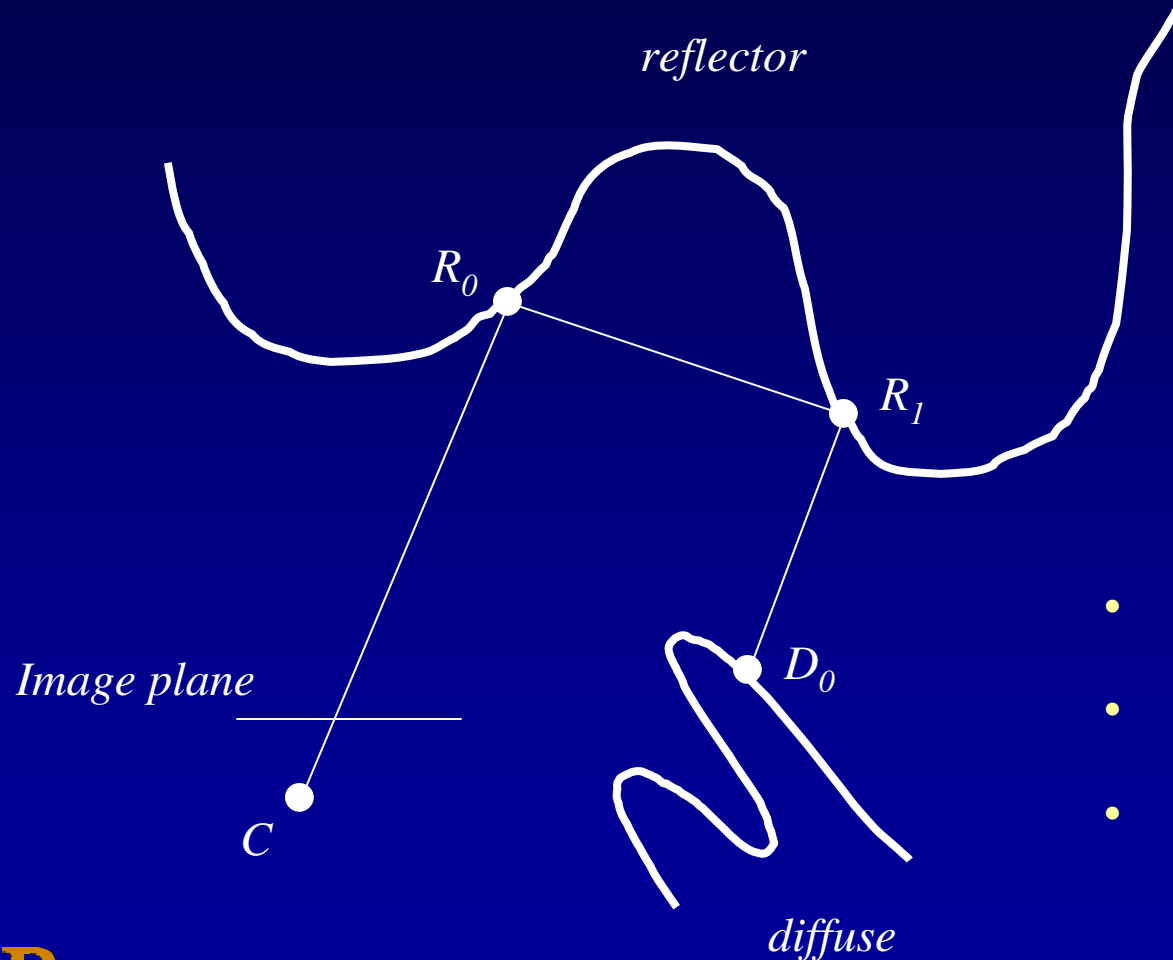
Reflections-motivation

- Occur in many scenes of interest to computer graphics applications
- Have a high esthetic value
- Help scene understanding
  - Surface properties, materials
  - Relative position of objects

Reflections-motivation

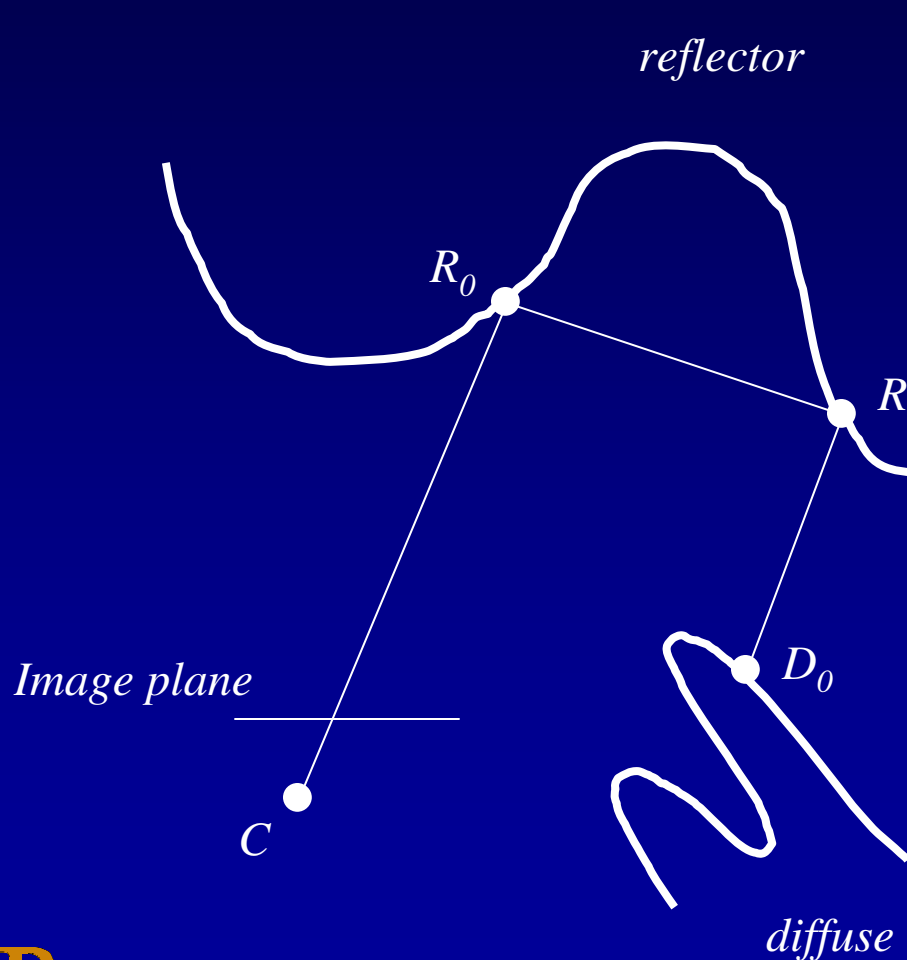- Occur i
  graphic

- Have a

- Help so
  - Surfa
  - Relat

Reflections-open problem

reflector

R_0

R_1

Image plane

D_0

C

diffuse

- Sub-problem 1—finding intersection with reflector
- Sub-problem 2—computing reflected rays
- Sub-problem 3—recursively trace each reflected ray

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Interactive graphics approximations

reflector

R_0

R_1

Image plane

D_0

C

diffuse

- Sub-problem 1—finding intersection with reflector
  - Feed-forward render reflector geometry
- Sub-problem 2—computing reflected rays
  - One outgoing ray per incoming ray
- Sub-problem 3—recursively trace each reflected ray
  - Approximate reflected scene (drastically)

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Goal: better reflected scene approximations

- A good reflected scene approximation:
  - Can be constructed quickly from conventional scene representations
    - BBs and DIs are constructed efficiently in hardware
  - Provides fast intersection-with-ray operation
    - BBs: line-plane intersection, DIs: problem
  - Allows efficient level-of-detail computation
    - BBs and DIs mip-mapping

Inspiration: Image-Based Rendering

- Impostors have been used before to accelerate rendering
- Billboards (BB)
  - Planar texture mapped quads with background masks
- Depth images (DI)
  - RGBZ per pixel

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Goal: better reflected scene approximations

- A good reflected scene approximation:
  - Can be constructed quickly from conventional scene representations
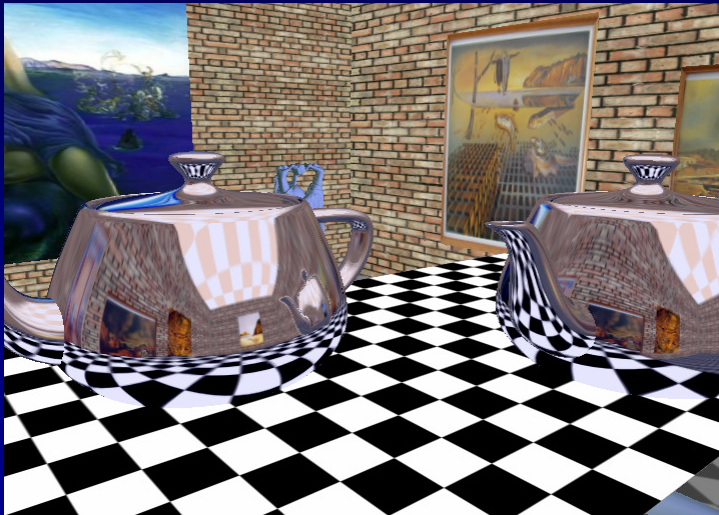 - Provides fast intersection-with-ray operation
  - Allows efficient level-of-detail computation

Billboards

Environment mapping   *BBGEM*

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Reflective billboards

RBBGEM

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More of the same
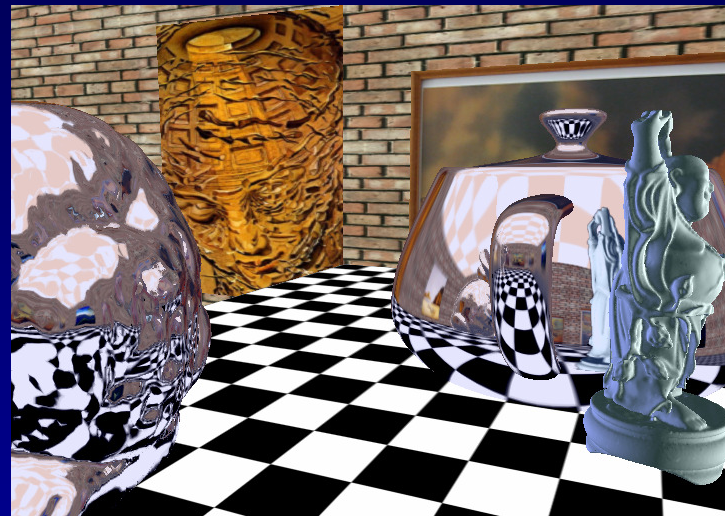
RBBGEM

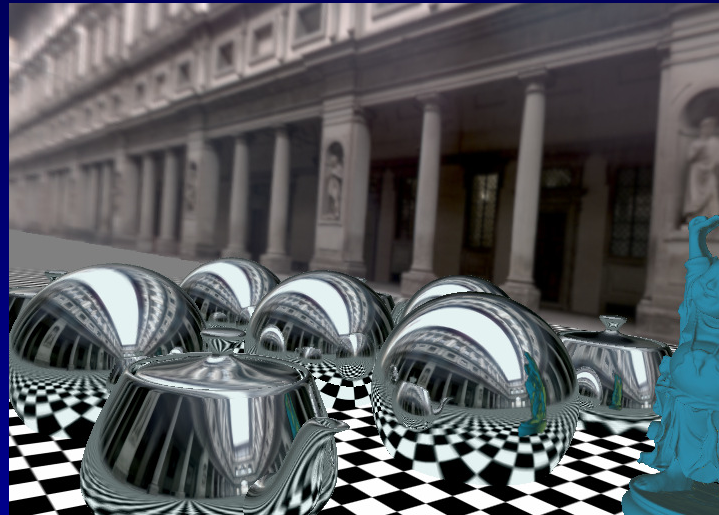# Continuous transition from GEM to EM
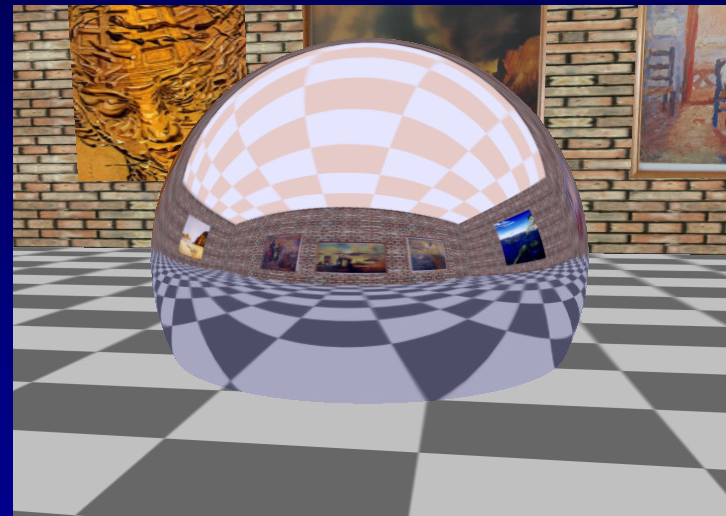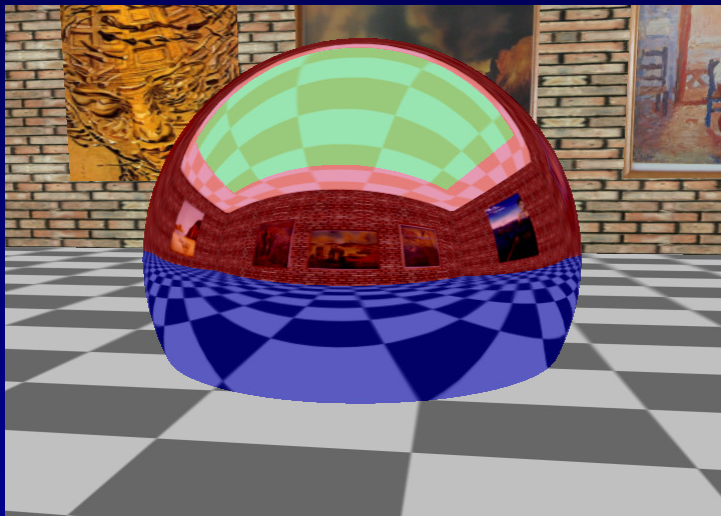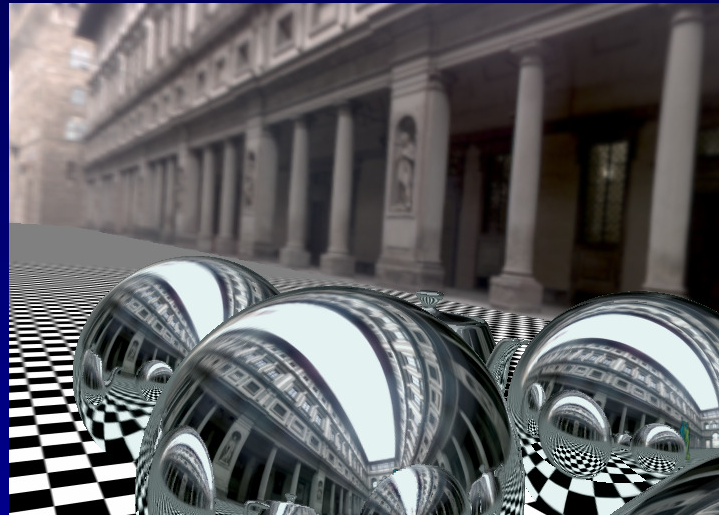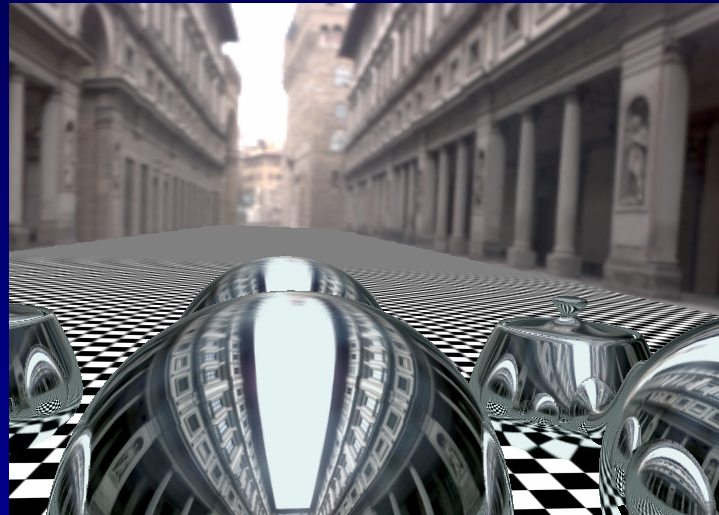

CGEM

Real World Environment
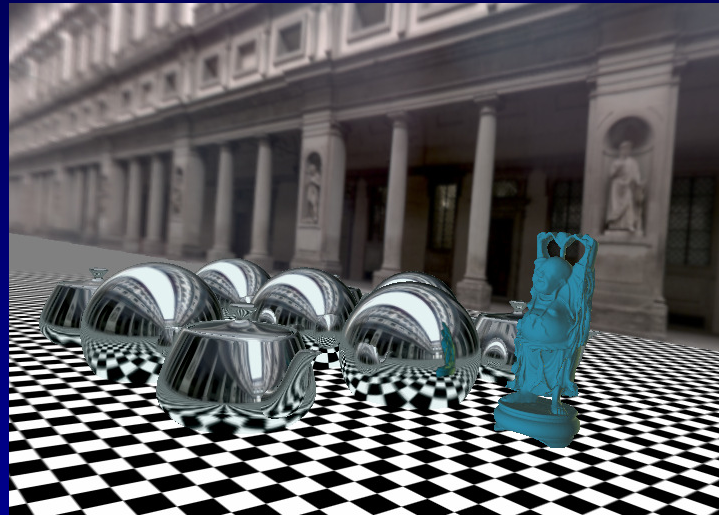
9 reflectors, 18 first order reflections, 72 second order reflections, 10Hz

Real World Environment

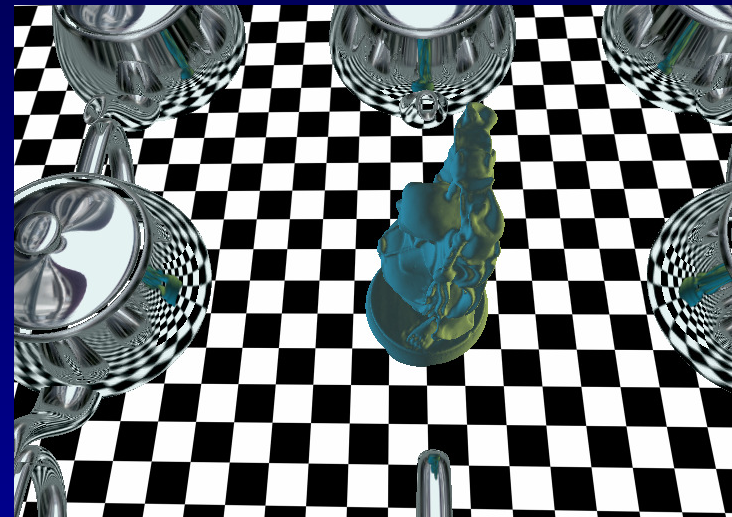*9 reflectors, 18 first order reflections, 72 second order reflections, 10Hz*

Real World Environment

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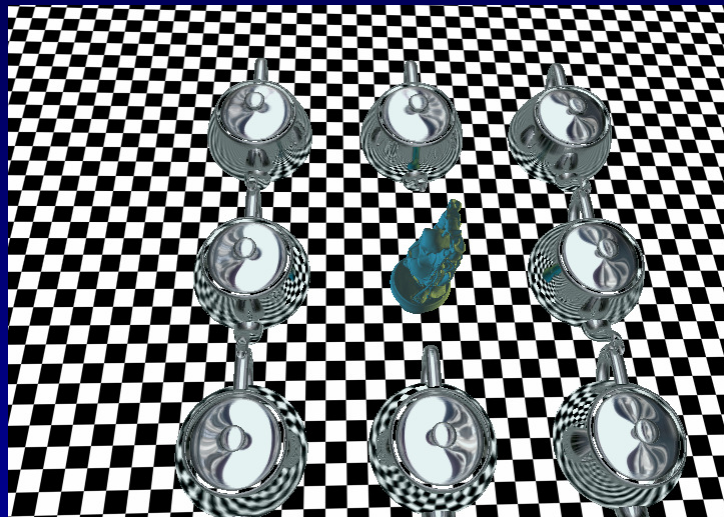
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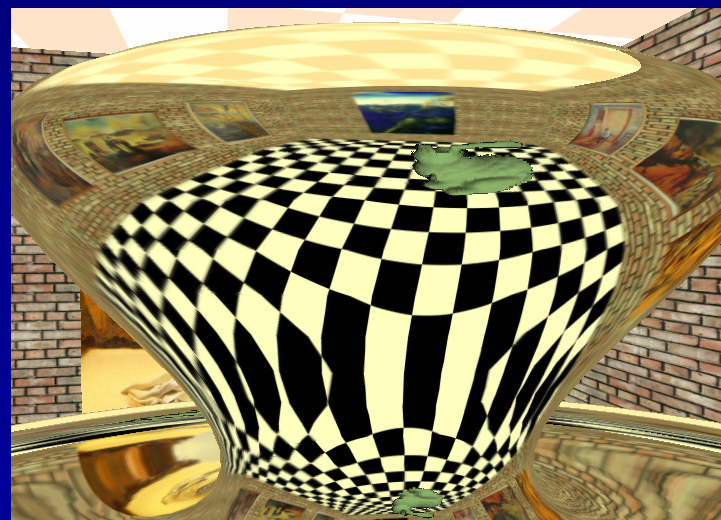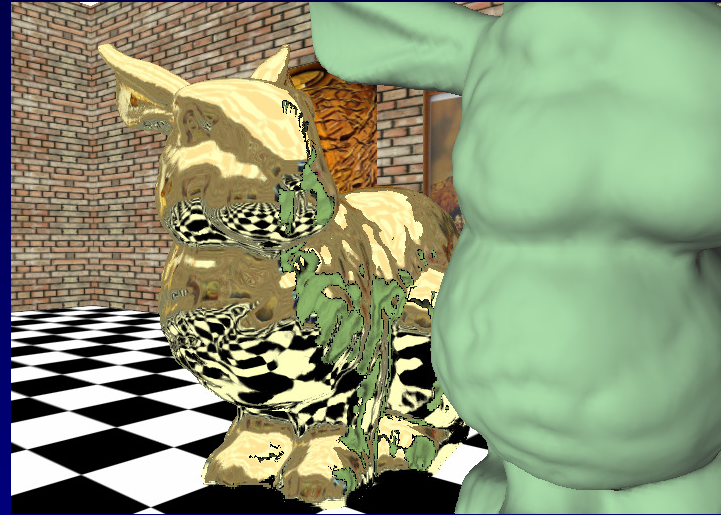UNIVERSITY

Real World Environment

9 reflectors, 18 first order reflections, 72 second order reflections, 10Hz

Teapots only, please

9 reflectors, 18 first order reflections, 72 second order reflections, 10Hz

Depth Image Impostors

DGEM