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
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Reflections-open problem

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

- 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)
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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Billboards

Environment mapping  BBGEM
Reflective billboards

RBBGEM
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
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Teapots only, please

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Depth Image Impostors

DGEM