An Object-Space Approach to Shadowing for Hair-Shaped Objects

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Background
- Hair-shaped objects
  - Thin
  - Transparent
- Image Space Anti-Aliasing (ISAA)
  - Speed and quality depend on filter size

Previous Shadowing
- Shadow Map [Williams 1978]
  - Using depth values
  - Real-time
  - Aliasing
- Opacity Shadow Maps (OSMs) [Kim and Neumann 2001]
  - Using opacity maps
  - Transparent shadows
  - Zonal aliasing
- Deep Opacity Maps (DOMs) [Yuksel and Keyser 2008]
  - Accelerated OSMs
  - Zonal aliasing removed

Procedure
- Get depth values
- Get opacity values
- Render

Results
- DOMs with ISAA
- Our method

Execution Environment
- OS: Windows 8.1 64bit
- CPU: Intel Core-i7 3.4GHz
- GPU: GeForce GTX760
- RAM: 32GB
- API: OpenGL 4.0
- Triangle polygon: 2,880,000
- Vertices: 1,441,098

Object Space Anti-Aliasing
- Choose an appropriate pair of consecutive Opacity Maps (green lines) w.r.t. Depth Map when rendering arbitrary point
- Interpolate the opacity values and render anti-aliased shadows
- Do not have to use post processing with ISAA

Limitations
- Detailed shapes cannot be represented
- Difficult to render hard shadows

Future works
- Speed-up through combining neighboring splats
- Adopted to multiple light sources

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