

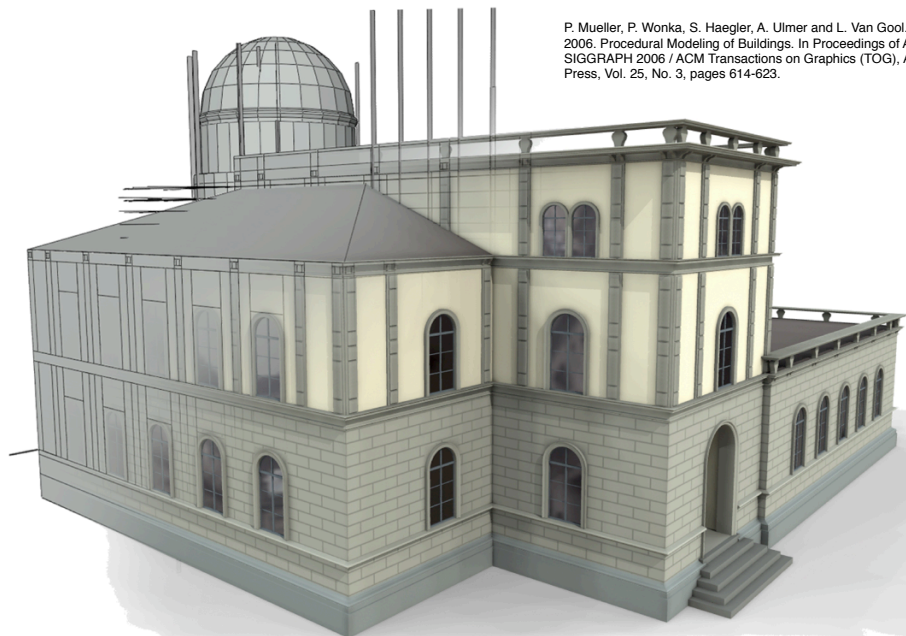
some recent graphics research  
to inspire final projects

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bryan klingner (klingner@cs)

## Procedural Modeling of Buildings - SIGGRAPH '06

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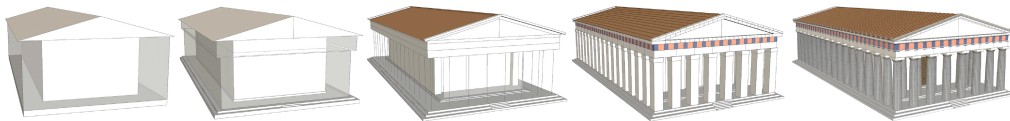
P. Mueller, P. Wonka, S. Haegler, A. Ulmer and L. Van Gool.  
2006. Procedural Modeling of Buildings. In Proceedings of ACM  
SIGGRAPH 2006 / ACM Transactions on Graphics (TOG), ACM  
Press, Vol. 25, No. 3, pages 614-623.

## Procedural Modeling of Buildings - SIGGRAPH '06

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Production process:

- β Rule-driven modification & replacement of shapes
- β Iteratively evolve a design by creating more and more details
- β Sequential application (like Chomsky grammars)



# Procedural Modeling of Buildings

## Automatic Photo Pop-up - SIGGRAPH '05

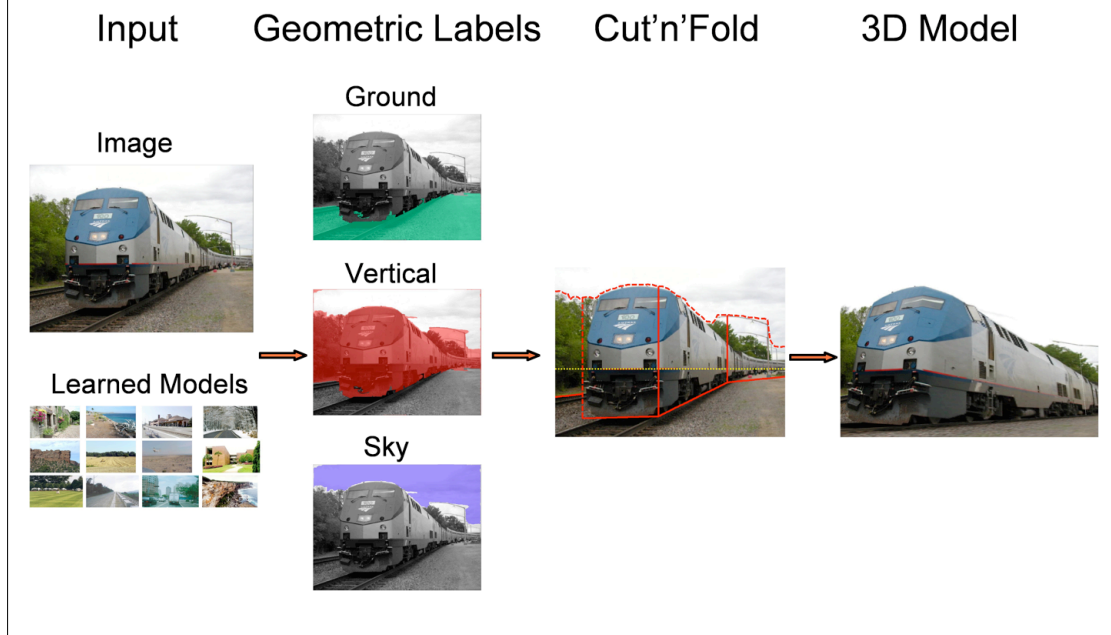
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D. Hoiem, A.A. Efros, and M.  
Hebert, "Automatic Photo Pop-up",  
ACM SIGGRAPH 2005.



## Automatic Photo Pop-up - SIGGRAPH '05

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## Automatic Photo Pop-up - SIGGRAPH '05

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### **Automatic Photo Pop-up**

**D. Hoiem A.A. Efros M. Hebert**  
**Carnegie Mellon University**

## Saliency-Preserving Color Removal - SIGGRAPH '05

Amy A. Gooch, Sven C. Olsen, Jack Tumblin, Bruce Gooch.  
Color2Gray: Saliency-Preserving Color Removal. ACM  
SIGGRAPH 2005.



color image



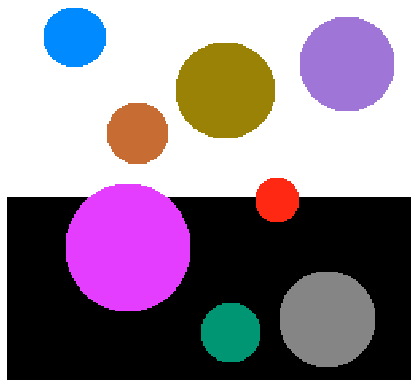
new algorithm



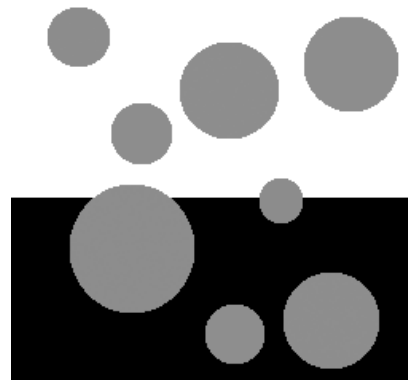
grayscale

## Saliency-Preserving Color Removal - SIGGRAPH '05

### Problem: Isoluminant Colors

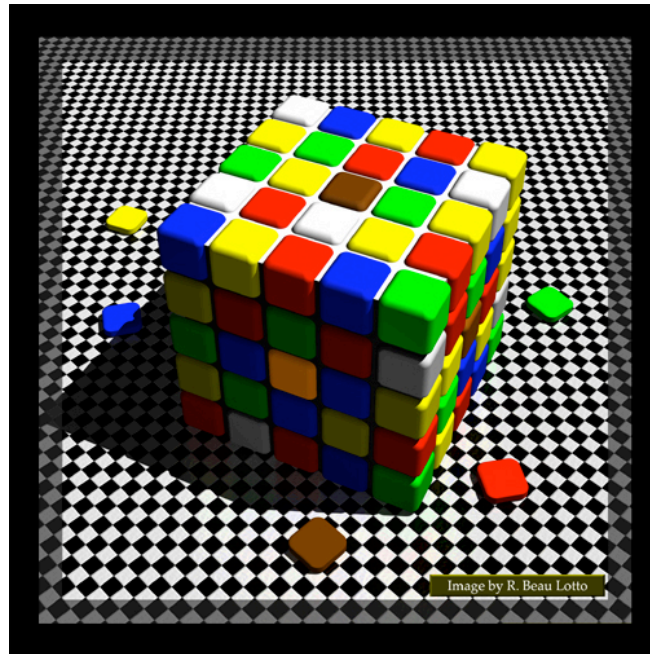


color

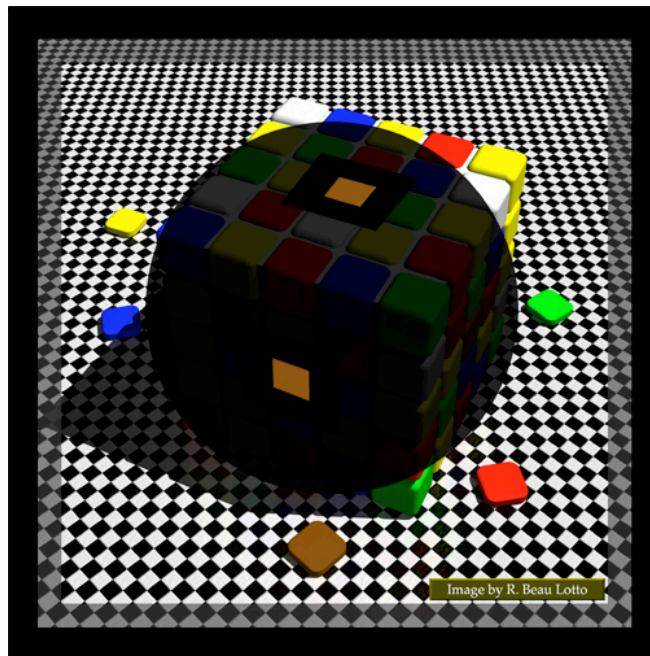


grayscale

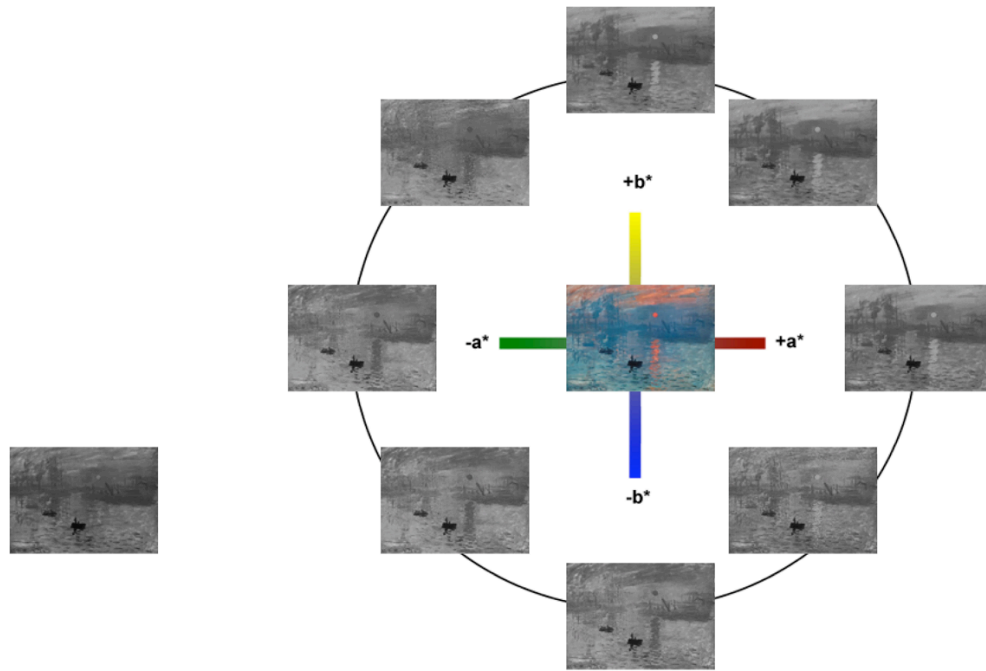
Saliency-Preserving Color Removal - SIGGRAPH '05



Saliency-Preserving Color Removal - SIGGRAPH '05



# Saliency-Preserving Color Removal - SIGGRAPH '05



# Saliency-Preserving Color Removal - SIGGRAPH '05



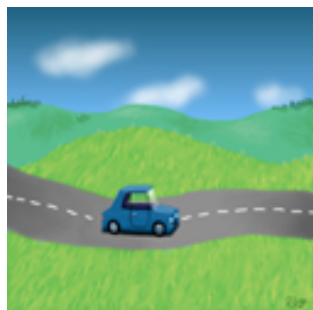
color



Photoshop Gray



Color2Gray



## Physically-Based Animation and Modeling

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- Most things in graphics are animated by humans
- Some things--like smoke, fire, and liquid--are too complex to feasibly animate realistically by hand
- Instead, we use physical models of fluid flow, fracture, etc, cut corners, and render the result.

A Method for Animating Viscoelastic Fluids - SIGGRAPH '05

### **"A Method for Animating Viscoelastic Fluids"**

Tolga G. Goktekin

Adam W. Bargteil

James F. O'Brien

ACM SIGGRAPH 2004

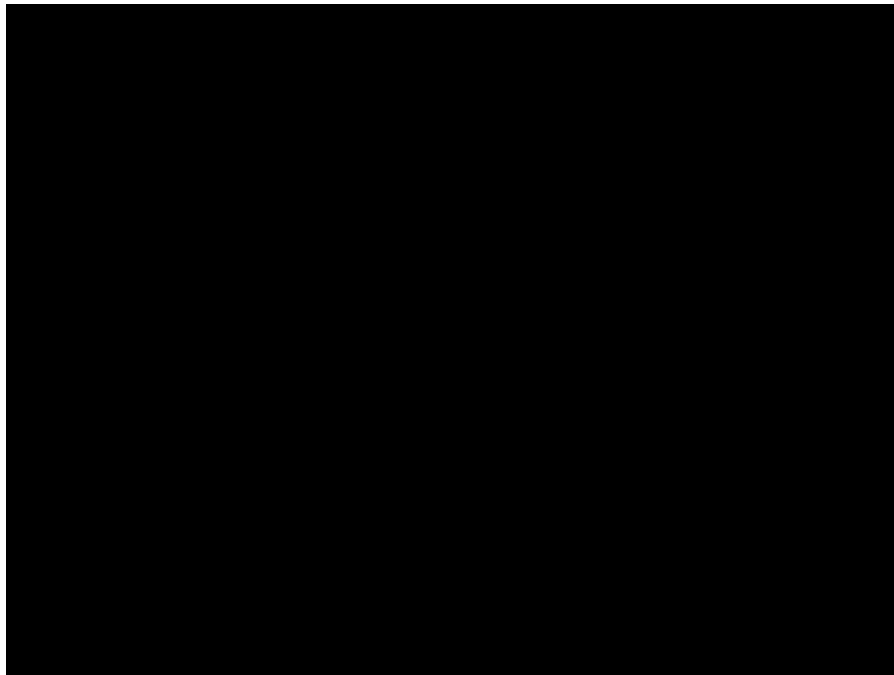
*University of California, Berkeley*



Animating Gases with Hybrid Meshes - SIGGRAPH '05



Fluids in Deforming Meshes - SCA '05



Fluid Animation with Dynamic Meshes - SIGGRAPH '06

# Fluid Simulation with Dynamic Meshes

Bryan Klingner  
Bryan Feldman  
Nuttapong Chentanez  
James O'Brien

University of California, Berkeley

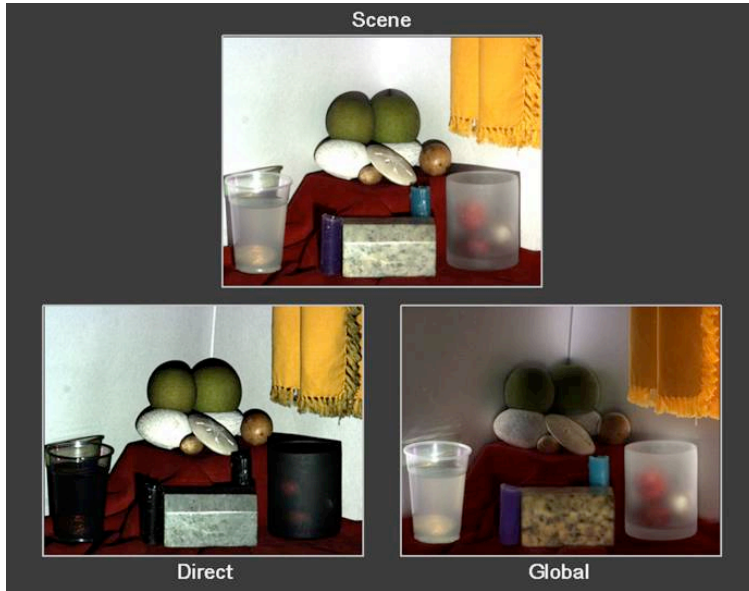
Simultaneous Coupling of Fluids and Deformable Bodies - SCA '06

# Simultaneous Coupling of Fluids and Deformable Bodies

Nuttapong Chentanez  
Tolga G. Goktekin  
Bryan E. Feldman  
James F. O' Brien

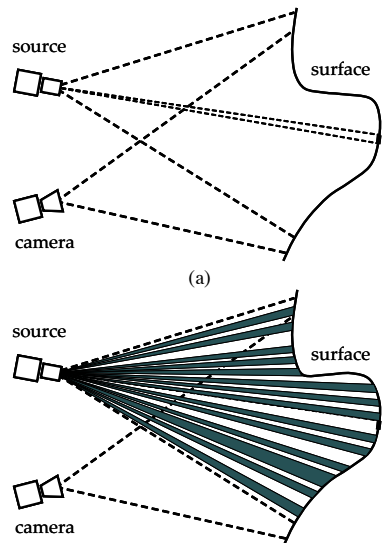
University of California, Berkeley

# Fast Separation of Direct and Global Components of a Scene Using High Frequency Illumination - SIGGRAPH '06



"Fast Separation of Direct and Global Components of a Scene using High Frequency Illumination,"  
S.K. Nayar, G. Krishnan, M. D. Grossberg, R. Raskar,  
ACM Trans. on Graphics (also Proc. of ACM SIGGRAPH),  
Jul, 2006.

# Fast Separation of Direct and Global Components of a Scene Using High Frequency Illumination - SIGGRAPH '06



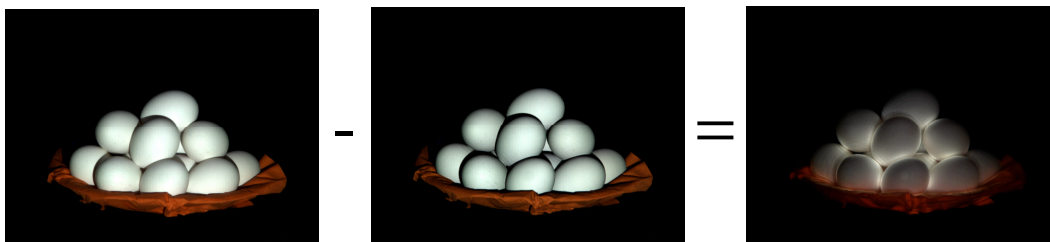
Fast Separation of Direct and Global Components of a Scene  
Using High Frequency Illumination - SIGGRAPH '06

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Fast Separation of Direct and Global Components of a Scene  
Using High Frequency Illumination - SIGGRAPH '06

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scene

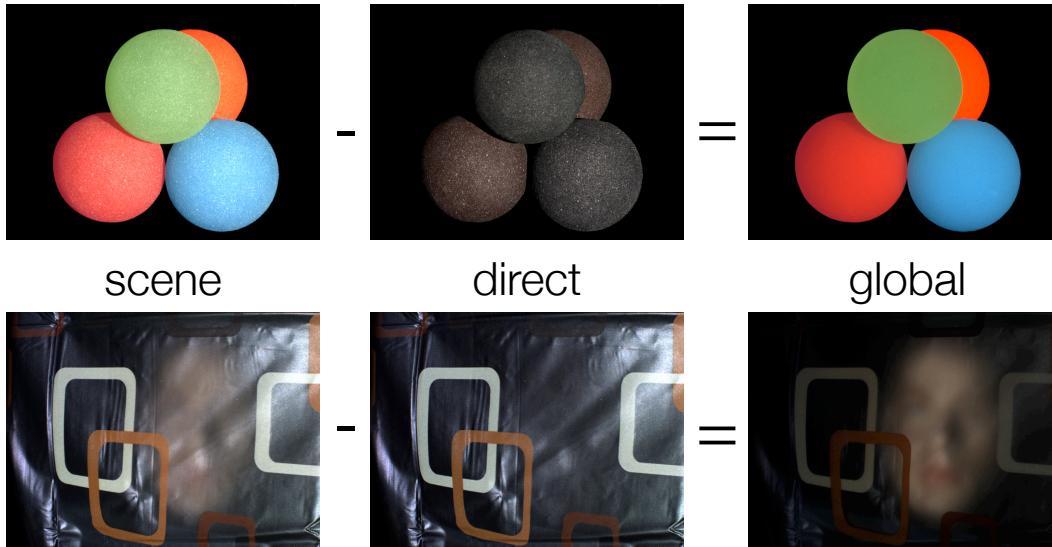
direct

global



## Fast Separation of Direct and Global Components of a Scene Using High Frequency Illumination - SIGGRAPH '06

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## Real-time Fun

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- Deformations
- Ambient Occlusion
- Soft Shadows
- Fluid Flows

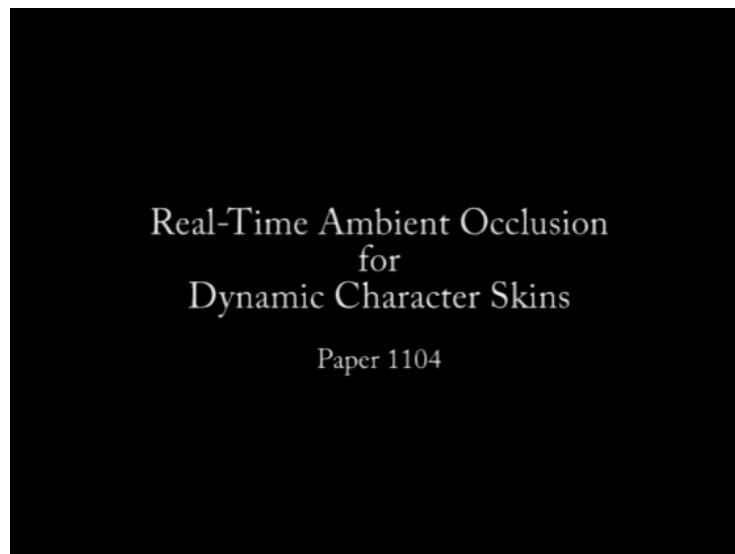
## Meshless Deformations Based on Shape Matching - SIGGRAPH '05



M. Mueller, B. Heidelberger,  
M. Teschner, M. Gross:  
Meshless Deformations  
Based on Shape Matching  
Proceedings of  
SIGGRAPH'05, Los Angeles,  
USA, July 31 - August 4, 2005

## Precomputed Ambient Occlusion for Character Skins - SIGGRAPH Sketch '06

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Kirk, A. G., Arkan, O.,  
"Precomputed  
Ambient Occlusion for  
Character Skins" To  
appear in ACM  
SIGGRAPH 2006.  
Technical Sketch.

# Real-Time Soft Shadows - SIGGRAPH '06

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Real-time Soft Shadows in Dynamic Scenes using Spherical Harmonic Exponentiation Zhong Ren, Rui Wang, John Snyder, Kun Zhou, Xinguo Liu, Bo Sun, Peter-Pike Sloan, Hujun Bao, Qunsheng Peng, Baining Guo. To Appear in ACM SIGGRAPH 2006.

## Real-time Soft Shadows in Dynamic Scenes using Spherical Harmonic Exponentiation

Zhong Ren<sup>1</sup> Rui Wang<sup>1</sup> John Snyder<sup>2</sup> Kun Zhou<sup>3</sup> Xinguo Liu<sup>3</sup>  
Bo Sun<sup>4</sup> Peter-Pike Sloan<sup>5</sup> Hujun Bao<sup>1</sup> Qunsheng Peng<sup>1</sup> Baining Guo<sup>3</sup>

<sup>1</sup>Zhejiang University <sup>2</sup>Microsoft Research <sup>3</sup>Microsoft Research Asia  
<sup>4</sup>Columbia University <sup>5</sup>Microsoft Corporation

# Model Reduction of Complex Dynamics - SIGGRAPH '06

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Model Reduction for Real-time Fluids  
Treuille, A. Lewis, A. Popović, Z.  
ACM Transactions on Graphics 25(3)

## Model Reduction for Real-Time Fluids