Computer Graphics
Summary and Outlook

Matthias Teschner

Introduction to Computer Graphics

Rendering

Modeling

Simulation

Homogeneous Notation

Ray Casting

Bézier Curves

Particle Fluids

Rasterization

Piecewise Polynomial Curves

Phong

Rendering – Modeling – Simulation

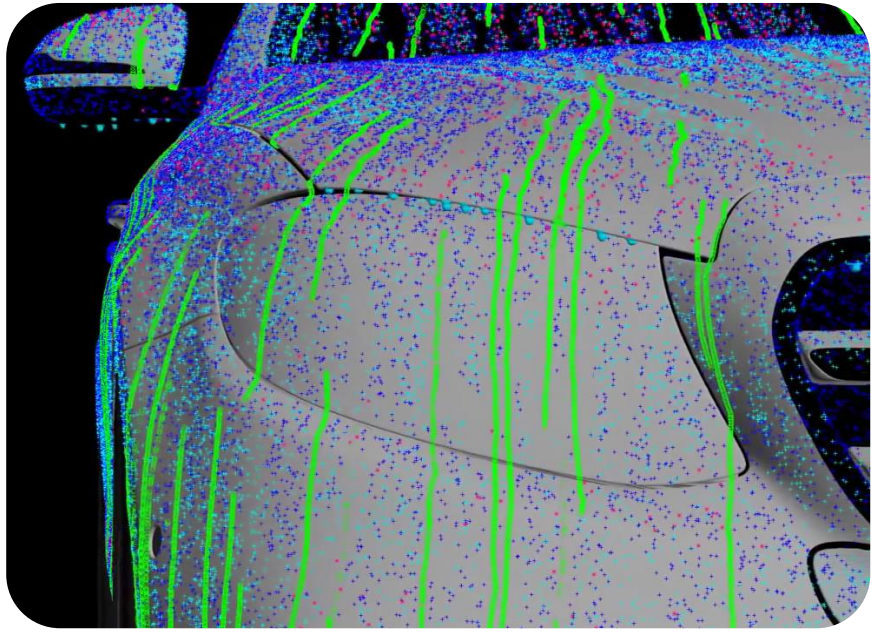
© Spellwork Pictures

Modeling

Rendering

Rendering – Modeling – Simulation

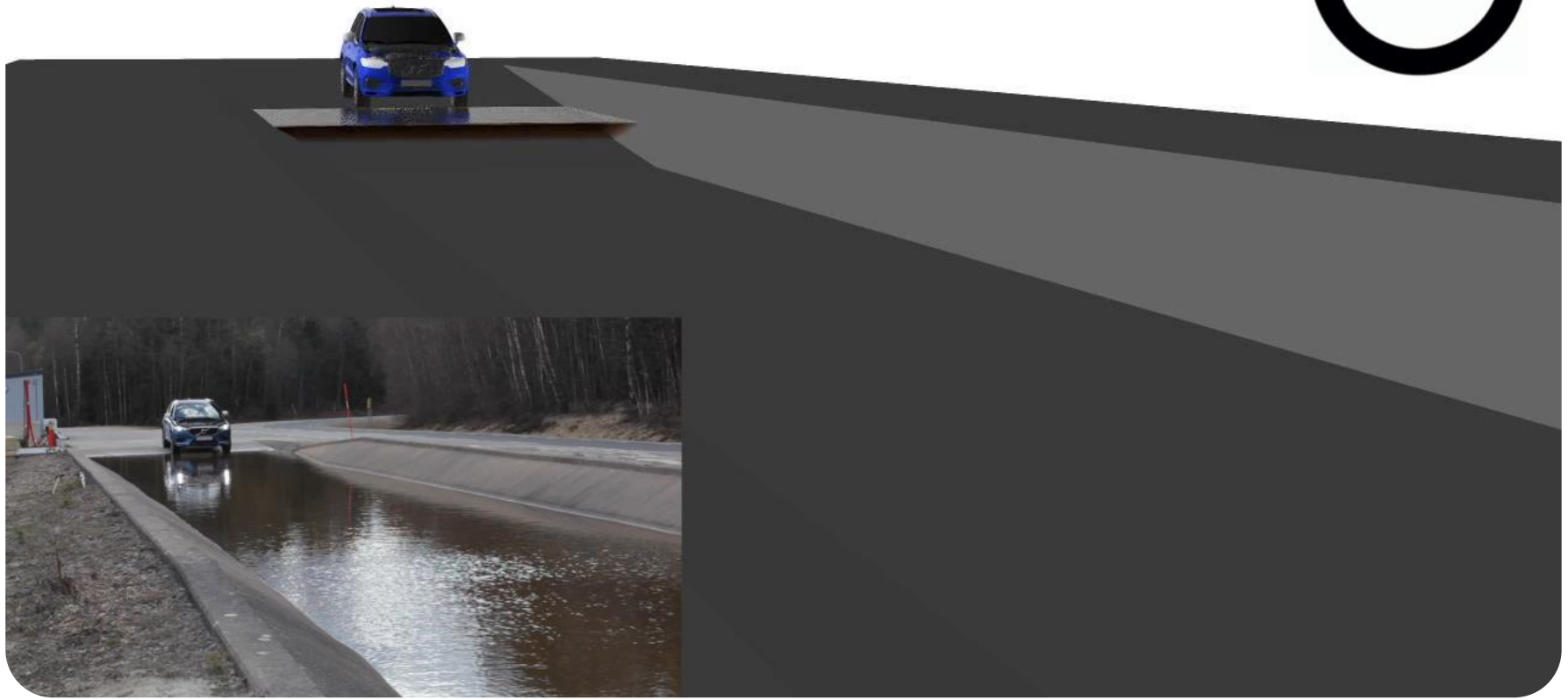
© Spellwork Pictures



Animation

Rendering

Rendering – Modeling - Simulation



Johan Idoffsson
Chalmers University

Volvo Cars

Simulated and rendered with
PreonLab
FIFTY2 Technology

Specialization Courses – Topics

Rendering	Simulation
Light: Radiometric Quantities	Particle Motion
Material: BRDF	Elastic Solids
Light / Material: Rendering Equation	Fluids (Particles and Grids)
Radiosity	Rigid Bodies
Stochastic Raytracing	Contact

Specialization Courses – Concepts

Rendering

Simulation

Finite Element Modeling

Finite Differences

Monte Carlo Integration

Smoothed Particle Hydrodynamics

Linear Systems

Spatial Data Structures

Real Time Graphics / High Performance Computing

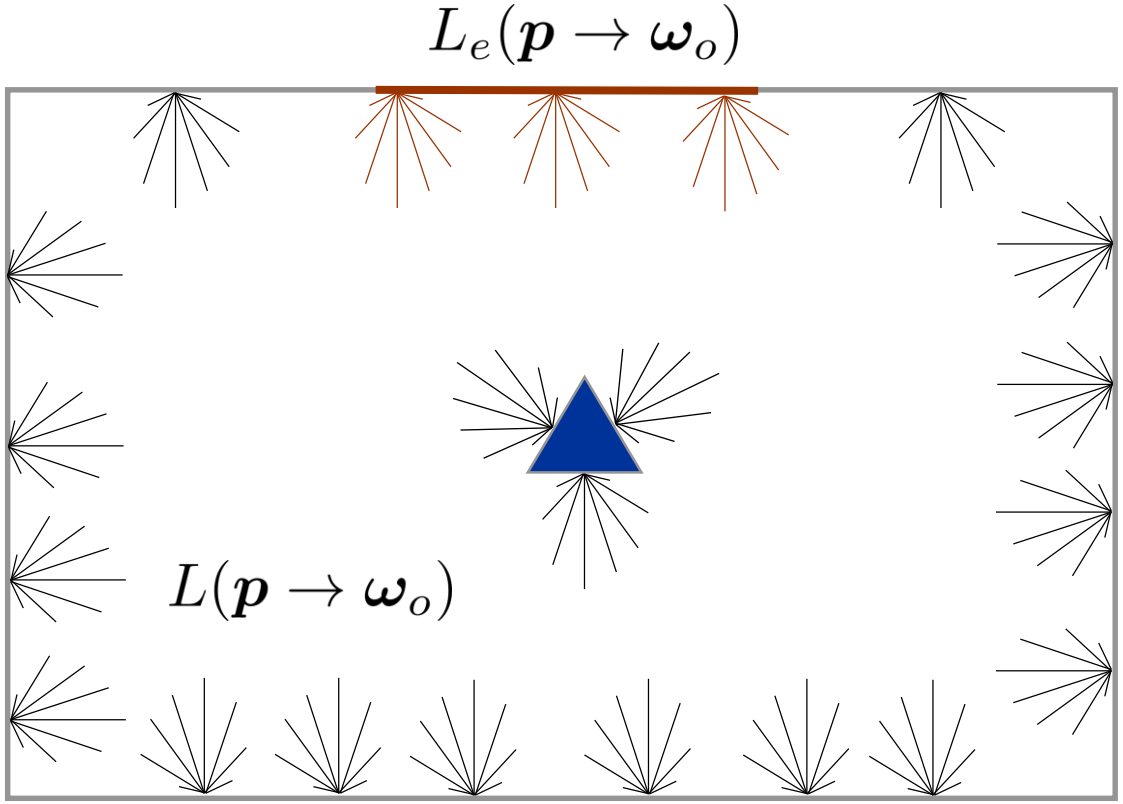
Rendering Equation

- $L(\boldsymbol{p} \rightarrow \boldsymbol{\omega}_o) = L_e(\boldsymbol{p} \rightarrow \boldsymbol{\omega}_o) + \int_\Omega f_r(\boldsymbol{p}, \boldsymbol{\omega}_i \leftrightarrow \boldsymbol{\omega}_o) L(\boldsymbol{p}' \leftarrow \boldsymbol{\omega}_i) \cos(\boldsymbol{\omega}_i, \boldsymbol{n}_p) \mathrm{d}\omega_i$
- Establishes relations between incident and exitant radiances
- Expresses the steady state of radiances in a scene
- Governs the computation of radiances from all scene points into all directions

Akenine-Möller et al.

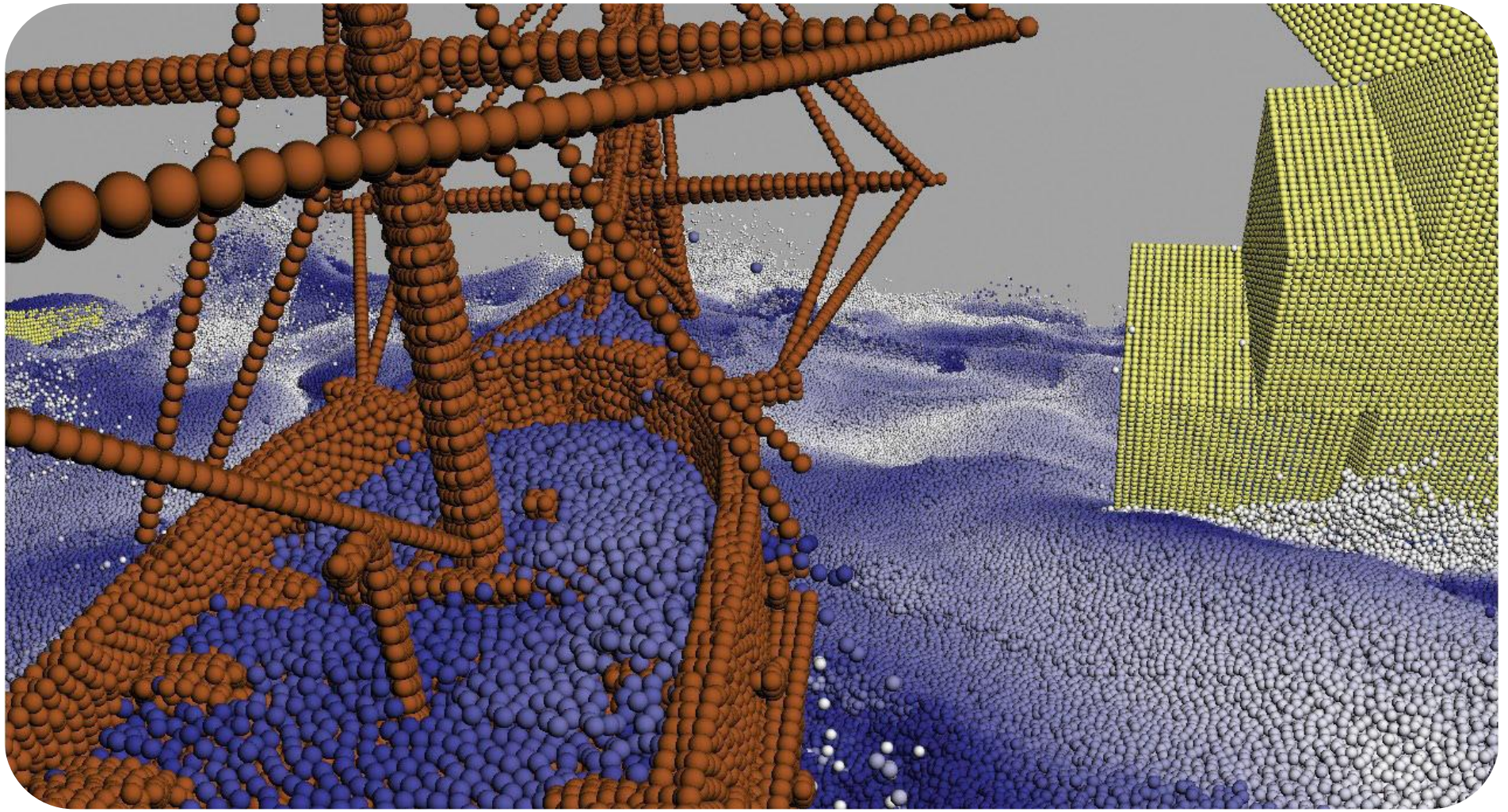
Solving the Rendering Equation

– Exitant radiances from all scene points into all directions



Cornell box

Particle Simulation



Projects – Theses

Rendering Track	Simulation Track
Simple Raytracer	Simple Fluid Solver
Stochastic Raytracer	Incompressible SPH Solver
Features / Performance / Accuracy	
Research	

Image Processing

- Slides, recordings, information on
  - https://lmb.informatik.uni-freiburg.de/lectures/image_processing/
- First question-and-answer session on
  - Monday, June 14, 10:15

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