

# *Seminar*

# *Advanced Topics in Rendering*

Matthias Teschner

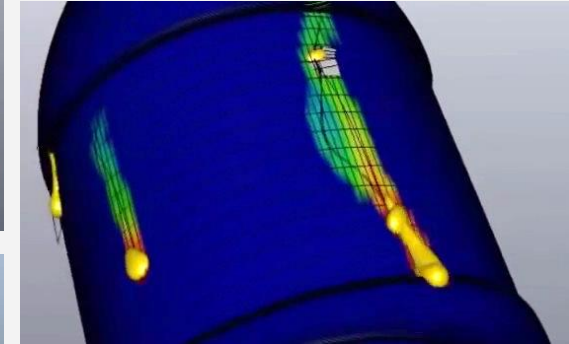
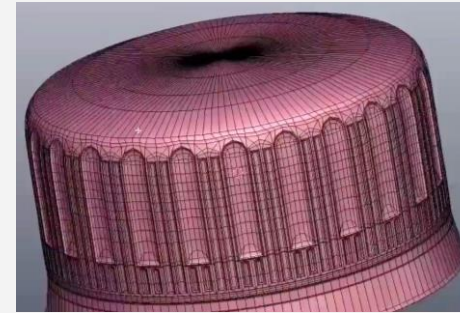
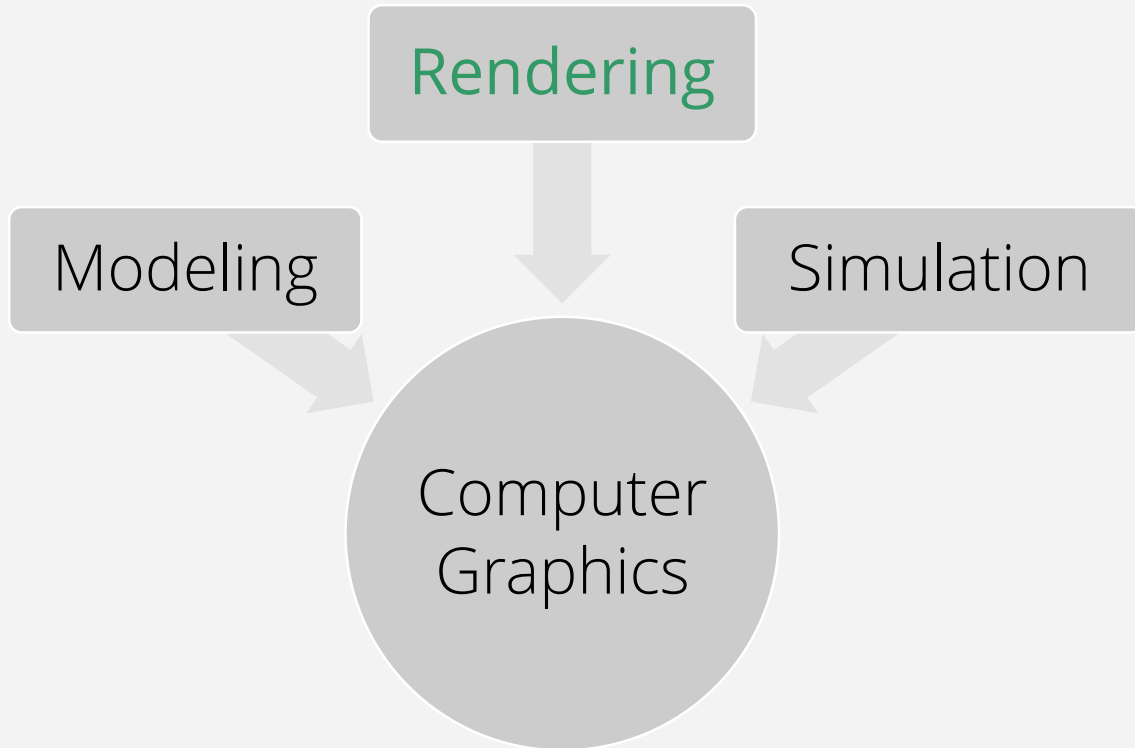


# Outline

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- Introduction
- Organization
- Presentation
- Topics
- Summary

# Computer Graphics



CGI Making of Share a Coke VFX  
Breakdown by ARMA

# Graphics Courses

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- Key course
  - Image processing and computer graphics (modeling, rendering, simulation)
- Specialization courses
  - Advanced computer graphics (global illumination)
  - Simulation in computer graphics (deformable and rigid solids, fluids)
- Master project, lab course, Master thesis
  - Simulation track, rendering track

# Seminars / Projects / Theses in Graphics

Semester	Simulation Track	Rendering Track
Winter	Simulation Course	
Summer	Key Course Lab Course - Simple fluid solver Simulation Seminar	Key Course Lab Course - Simple Ray Tracer Rendering Seminar
Winter	Master Project - PPE fluid solver Rendering Seminar	Rendering Course Master Project - Monte Carlo RT Simulation Seminar
Summer	Master Thesis Research-oriented topic	Master Thesis Research-oriented topic

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# Requirements

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- Oral presentation of a rendering topic
  - English / German
  - Slides should be in English
- Written report
  - English / German

# Goal

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- Familiarize yourself with a topic
- Prepare a comprehensible presentation
- Presentation should be based on a scientific publication
  - Do not just reproduce the manuscript
  - Adapt the organization and the focus of the document in order to get a comprehensible presentation



# *Presentations*

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- Take place at the same time and in the same room as the introduction or per video conference
  - Announced in the course catalog and on our web page <https://cg.informatik.uni-freiburg.de/teaching.htm>
    - Advanced Topics in Rendering
      - Schedule
- Attendance is mandatory

# *Report and Submissions*

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- Written report (approx. 10 pages)
- Submission of presentation slides and written report in two separate PDF files
  - YourLastName\_report.pdf
  - YourLastName\_presentation.pdf
- Per email to Prof. Teschner
- Until the last day of lectures of the semester

# Registration

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- Check for available topics and dates
  - <https://cg.informatik.uni-freiburg.de/teaching.htm>
    - Advanced Topics in Rendering
    - Schedule
- Send an email to Prof. Teschner with your registration request stating name, topic, date
- Do not forget to register for the seminar in the campus management system

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# *Presentation*

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- 25 min – 35 min per presentation
- 10 min – 15 min discussion
  - Technical questions
  - Form of the presentation

# Preparation

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- Know your topic
  - Examine relevant material thoroughly
  - Do not try to circumvent problems
- Create slides
  - Allow 1 to 2 minutes per slide
  - Slides should be uniform and not too dense
  - Incorporate illustrations, slide titles should be helpful
- Rehearse your presentation
  - Gather feedback, adapt your presentation accordingly

# Presentation

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- Introduction
  - Introduce yourself and the title of your presentation
- Overview
  - Give an idea, but not too detailed
- Motivation
  - Illustrate the principle and / or applications
  - Explain the goal of your presentation
  - The audience should be eager to listen your presentation

# Presentation

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- Main part
  - Should be structured in sections
  - Separate different sections of the presentation explicitly
  - Each section should be introduced and summarized
- Summary
  - Tell the audience what you have told them
  - Ask for questions



# *Presentation*

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- Check the presentation environment prior to the presentation
- Avoid idiosyncrasies
- Stay in time

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# Topics

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- General concepts
- Rasterization
- Radiosity
- Ray tracing
- Related topics

# General Concepts

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- Human visual system / light modeling / radiometry
- Materials / shading models / BRDFs
- Rendering equation
- Monte Carlo integration
- Aliasing / Antialiasing
- Sampling / Reconstruction

# *Rasterization, Radiosity*

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- Rasterization
  - Topics, not covered in the key course
  - E.g. shadows
- Radiosity
  - Concept

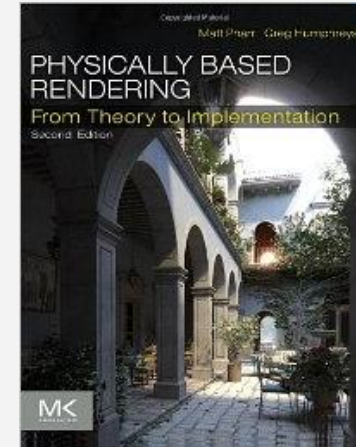
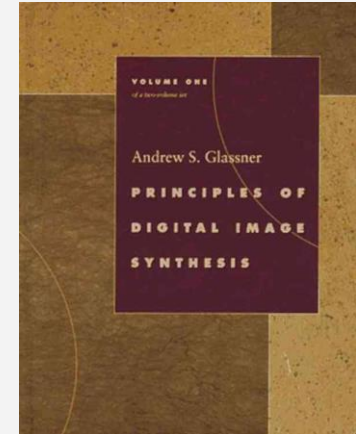
# *Ray Tracing, Related Topics*

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- Ray tracing
  - Path tracing
  - Bidirectional methods, e.g. photon mapping
  - Volume ray tracing
- Related topics
  - Acceleration data structures
  - Dual Conturing, Marching Cubes

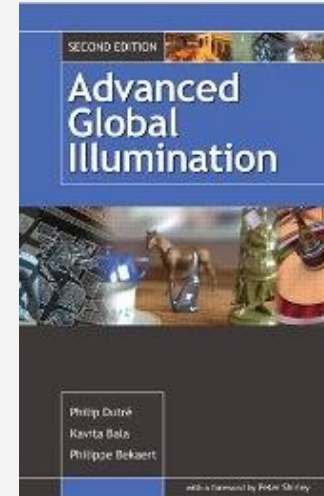
# Sources

- Andrew Glassner  
Principles of Digital Image Synthesis  
<http://www.realtimerendering.com/raytracing.html>
- Matt Pharr, Wenzel Jakob, Greg Humphreys  
Physically Based Rendering  
<http://www.pbr-book.org/>



# Sources

- Philip Dutre, Kavita Bala, Philippe Bekaert  
Advanced Global Illumination  
A K Peters
- Eric Haines, Thomas Akenine-Moeller  
Ray Tracing Gems  
Apress  
<https://link.springer.com/book/10.1007/978-1-4842-4427-2>





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# Summary

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- Oral presentation of 25-35 min
- Written report of 10 pages
- Topics overview and presentation dates
  - <https://cg.informatik.uni-freiburg.de/teaching.htm>
  - Advanced Topics in Rendering