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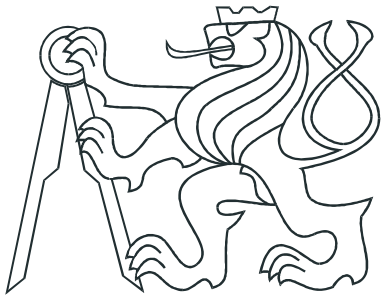

Masterer Thesis

Progressive Computation of Global Illumination

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Aknowledgements

I would like to thank to Hanka Pokorná, who has always supported me. And also to Ing. Jaroslav Sloup for supervision of this thesis.

Declaration

I hereby declare that I have completed this thesis independently and that I have listed all the literature and publications used.

Prague, 10. 11. 2012 _____ _____

Signature

Abstract

Rendering volumetric phenomenas such as smoke or fog has always been challenging and time consuming task. Recently few new progressive rendering techniques were discovered and this thesis aims to test them on various scenes containing participating media.

Abstrakt

Rendering opticky aktivních prvků jako je kouř či mlha, bylo vždy velice obtížné a časově náročné. V nedávné době se objevily nové progresivní metody výpočtu a v této diplomové práci je chceme vyzkoušet na různých scénách obsahujicích opticky aktivní prostředí.

Vložit zadani prace

Contents

List of Figures

List of Tables

Chapter 1

Introduction

Problem definition. What is optically active environment and example images. What is challenging.

Why global illumination and why progressive methods

Chapter 2

Fundamentals of realistic image synthesis

2.1 Radiometry

1) what is radiometry

2) quantities: flux: irradiance: radiance:

Relationships between named quantities.

2.2 Surface interaction

assumptions and symplificaitions

2.2.1 BRDF

2.2.2 Rendering equation

Theory behind rendering equation, integration of radiometry quantities.

2.3 Volume interaction

In this chapter I will define basic radiometry quantities to build enough support knowledge for the next chapter.

2.3.1 Phase functions

2.3.2 Rendering equation including participating media

What steps have to be taken to get rendering equation to the next level.

2.4 Volume and surface interaction

In order to properly simulate light transport in the scenes containing both surfaces and volumetrically active media.

2.4.1 Extended rendering equation

Put together all the integrals

Chapter 3

Common solutions

In this chapter we will try to summarize the most common technics for solving the rendering equation in the presence of participating media.

3.1 Rasterization

Still most used in films and games - fast approximation. Particle rasterization + rendering slices of 3D volumes can solve only direct illumination.

3.2 Raytracing

3.2.1 Unbiased methods

Plus and cons

3.2.2 Biased methods

irradiance caching, Photon tracing, final gather ... Plus and cons

Chapter 4

Consistant progressive methods

what does it mean to be progressive

4.1 Stochastic progressive photon mapping

4.2 Beam mapping

Hybrid solution cpu gpu rasterization..

4.2.1 Virtual point lights

4.2.2 Virtual ray lights

4.2.3 Virtual beam lights

Chapter 5

Proposed solution

I have chosen these methods and why... How to do it scheme of the progressive raytracing renderer.

co tu ma byt pouzil jsem tuhle a tuhle metodu proc odkazat se na predchozi kapitolu a zminit zmeny ktere jsem provedl a proc.

Co jsem orezal co rozsiril.

A dojit k blokovemu schematu co budu muset imlementovat. Mozna zminit i PBRT.

Chapter 6

Implementation

I have decided to implement it using pbrt. what is pbrt what structures I will use, which I have to create.

V tehle kapitole muzu i ukazat ty veci z matlabu ze funguji a jak. Klidne popsat, i postup implemntace pres jednoduzsi az po slozitejsi metody.

Chapter 7

Results

Mely by tu byt tabulky a srovnani metod a ruzne parametry.

Chapter 8

Conclusion

this method was implemented and results are great

8.0.4 Future work

Appendinx A

Appendix

abreviations + test scene images

Appendinx B

DVD Content

galerie obrazku test scen