



Leopold-Franzens-Universität Innsbruck

Institute of Computer Science
Interactive Graphics and Simulation Group

Bachelor Thesis

Procedural Generation of Mountain Ranges Based on Geology

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advised by
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Innsbruck, May 28, 2016

Abstract

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Keywords keyword1, keyword2.

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Chapter 1

Introduction

1.1 Section One

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1.2 Section Two

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Chapter 2

Related Work

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Chapter 3

Methods

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Chapter 4

Results

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Chapter 5

Conclusion & Future Work

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Bibliography

- [1] Alain Fournier, Don Fussell, and Loren Carpenter. Computer Rendering of Stochastic Models. *Commun. ACM*, 25(6):371–384, June 1982.
- [2] K. Raiyan Kamal and Yusuf Sarwar Uddin. Parametrically Controlled Terrain Generation. In *Proceedings of the 5th International Conference on Computer Graphics and Interactive Techniques in Australia and Southeast Asia*, GRAPHITE '07, pages 17–23, New York, NY, USA, 2007. ACM.
- [3] Robert Krten. Generating Realistic Terrain. *Dr. Dobb's Journal: Software Tools for the Professional Programmer*, 1994.
- [4] Xing Mei, Philippe Decaudin, and Bao-Gang Hu. Fast Hydraulic Erosion Simulation and Visualization on GPU. In Marc Alexa, Steven J. Gortler, and Tao Ju, editors, *PG '07 - 15th Pacific Conference on Computer Graphics and Applications*, Pacific Graphics 2007, pages 47–56, Maui, United States, October 2007. IEEE.
- [5] Tomas Möller and Ben Trumbore. Fast, minimum storage ray/triangle intersection. In *ACM SIGGRAPH 2005 Courses*, page 7. ACM, 2005.
- [6] F. K. Musgrave, C. E. Kolb, and R. S. Mace. The Synthesis and Rendering of Eroded Fractal Terrains. In *Proceedings of the 16th Annual Conference on Computer Graphics and Interactive Techniques*, SIGGRAPH '89, pages 41–50, New York, NY, USA, 1989. ACM.
- [7] Jacob Olsen. Realtime Procedural Terrain Generation: Realtime Synthesis of Eroded Fractal Terrain for Use in Computer Games. 2004.
- [8] Erik Reinhard, Michael Stark, Peter Shirley, and James Ferwerda. Photographic tone reproduction for digital images. In *Proceedings of the 29th Annual Conference on Computer Graphics and Interactive Techniques*, SIGGRAPH '02, pages 267–276, New York, NY, USA, 2002. ACM.
- [9] M. Shimrat. Algorithm 112: Position of Point Relative to Polygon. *Commun. ACM*, 5(8):434–, August 1962.
- [10] Laurii Vitanen. Physically Based Terrain Generation: Procedural Heightmap Generation Using Plate Tectonics. B.S. Thesis, 2012.
- [11] Mason Woo, Jackie Neider, Tom Davis, and Dave Shreiner. *OpenGL Programming Guide: The Official Guide to Learning OpenGL, Version 1.2*. Addison-Wesley Longman Publishing Co., Inc., Boston, MA, USA, 3rd edition, 1999.