

# Preface

In the beginning of 2005, right after successful completion of my mathematical studies my professor asked me if I would like to continue my research in the haptic rendering by participating in an EU-project. As the project named HAPTEX involved several academic partners collaborating to reach a final very ambitious goal of feeling virtual textiles, I was immediately attracted by the idea working together with other international researchers. Moreover, as I already wrote my diploma thesis to some extent in the field of haptics, I was eager to extend my knowledge to create more sophisticated rendering algorithms. Especially the combination of physical simulation with real-time haptics motivated me as I am very interested in physics and graphic programming.

Since the start of the project in the same year I met experts of various fields, who shared their knowledge with me. Studying mathematics, I was rather focused on theoretical ideas with limited practical applications. In this project I gained some broader view of the mathematical tools and their use in different fields including mechanical engineering as well as control theory. With the text at hand I want to do the same as my partners did in sharing my gained knowledge with the reader. Its content is therefore directed to students with background in mathematics and computer science like me in the beginning of the project.

The monograph would have never been possible without the funding of the aforementioned project “HAPtic sensing of virtual TEXtile” (HAPTEX) under the Sixth Framework Programme (FP6) of the European Union (Contract No. IST-6549). The funding was provided by the Future and Emerging Technologies (FET) Programme, which is part of the Information Society Technologies (IST) programme and focuses on novel and emerging scientific ideas. For bringing the project to life (and thus requesting the funding) I thank Prof. Nadia Magnenat-Thalmann, Dr. Harriet Meinander, Prof. Franz-Erich Wolter, Dr. Ian Summers, and P.Eng. Fabio Salsedo.

At the same time I want to thank my doctoral adviser Prof. Franz-Erich Wolter for having this great opportunity to work in such an interesting field and to participate in the project. Moreover, I would also like to thank Prof. Nadia Magnenat-Thalmann for her effort to coordinate the project. Without her pushing all members to the limit, we would have never been successful in reaching the goal. Certainly, a project

lives from good collaboration and this was clearly given by the partners. I especially appreciated the discussions with Dr. Pascal Volino. I thank him for gaining insights in the modelling of textile mechanics and its efficient simulation.

I was also happy to collaborate with my long time working colleague Dennis Allerkamp in the project. He concentrated his research on the tactile rendering of the textile surfaces. He gave me not only moral support in our stressful work but also directed our interests towards the important things. I owe him a lot by his drive at work.

I will not forget to mention my students who were extremely helpful by their support in the development of the system. With the time pressure of the intermediate project goals I would not have succeeded without them. I therefore thank Rasmus Buchmann, Michael Hanel, Maximilian Müller and especially Steffen Blume and Daniel Glöckner who worked very hard on the software development.

Finally, I would have never finished my work without the support of my family and my wife. I also highly appreciated the work of my colleagues and friends to proof-read my manuscript. Thank you very much for your endurance.

Hannover, Germany

Guido Böttcher

Haptic Interaction with Deformable Objects

Modelling VR Systems for Textiles

Böttcher, G.

2011, XII, 140 p., Hardcover

ISBN: 978-0-85729-934-5