

VRIPHYS 17

13th Workshop on Virtual Reality Interactions and Physical Simulations

Lyon (France)
April 23 – 24, 2017

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Preface

The workshop on Virtual Reality Interactions and Physical Simulations (VRIPHYS) is one of the well-established international conferences in the field of computer animation and virtual reality. The goal of this workshop is to attract high-quality research papers in the domains of dynamic simulation and physical interaction in virtual reality environments. We also welcome papers showing on-going research with promising results and new technology with applications of related focus.

Since 2004, this annual workshop has provided an opportunity for researchers in computer animation and virtual reality to present and discuss their latest results, and to share ideas for potential directions of future research. The first workshop was held in Colima (Mexico), followed by successful workshops in Pisa (Italy), Madrid (Spain), Dublin (Ireland), Grenoble (France), Karlsruhe (Germany), Copenhagen (Denmark), Lyon (France), Darmstadt (Germany), Lille (France) and Bremen (Germany).

This year, the 13th VRIPHYS workshop is back to Lyon, and is hosted by the University of Lyon 1 and the LIRIS research laboratory. VRIPHYS is organized in cooperation with Eurographics (EG) and for the first time co-located with EG2017. The workshop takes place on April 23-24, 2017, with a technical program of 12 accepted full papers, posters, or short presentations of work in progress. Members of the International Program Committee (IPC) have reviewed the submitted full papers. Each paper has been evaluated by, at least, 3 reviewers that are experts in the field. The submission review management system (SRMv2) was provided by EG. The workshop proceedings are published in the EG Digital Library.

Two high-level keynote presentations will enlighten the workshop. Miguel A. OTADUY is an associate professor at the Department of Computer Science, URJC Madrid, Spain. Marek TEICHMANN is CTO at CMLabs Simulations Inc., Montréal, Canada. We would like to thank them very much for accepting our invitation.

The organizing committee would like to acknowledge the continuous and great help of S. Behnke for handling numerous questions regarding the submission and publication procedures. Finally, we would like to thank all members of the IPC and reviewers board for the very constructive and timely reviews, and special thanks to the members of the Steering Committee for their valuable help and advice.

The General Chair of VRIPHYS 2017: Fabrice Jaillet, LIRIS, IUT Lyon 1, France
Florence Zara, LIRIS, Université de Lyon, France

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Keynote Presentation

Simulation of True Cloth

Miguel A. Otaduy

URJC Madrid

Abstract

This talk will cover our recent work on the simulation of highly realistic cloth. This work started several years ago, by performing complex force and deformation measurements on pieces of real fabrics, and fitting elastic models to these measurements. We learned two important lessons: the elastic properties of cloth undergo a complex interplay between deformation modes, and real cloth suffers a huge hysteresis that has been mostly overlooked in computer animation. Our first approach was to address these challenges using traditional continuum elasticity models, and we became rather successful by deriving nonlinear elastic models and models of internal friction. But we came short of reaching the true complexity of cloth, and our second approach was to model cloth the way true cloth is built. Most garments are made of a yarn structure, and the interplay between yarns determines micro-scale effects, but also the macro-scale nonlinear behavior of cloth. However, the standard approach to simulate cloth at the yarn level suffers from high stiffness, nonlinearity, and lack of robustness. We have developed a model that leverages persistent yarn contacts in cloth to reach unprecedented accuracy, efficiency and robustness. Our model entails novel representations at the geometric and mechanical levels. It leads to expressive micro-scale effects such as snags or tearing, as well as macro-scale behaviors determined by the woven or knitted yarn structure.

Keynote Presentation

Fast, Stiff and Under Control

Marek Teichmann
CM Labs Simulations

Abstract

CM Labs builds real-time applications in one of the most challenging quadrants of physics simulation – at the intersection of fast, stiff, and stable! This is reflected not only in our training simulators, which accurately model the dynamical behaviour of heavy vehicles such as cranes and excavators, but also many other engineering simulations ranging from robotics control to system verification. In order to meet the demanding specifications required by these applications, we develop an optimized physics engine called Vortex with support for cables, vehicles, and earthmoving. I will give an overview of the engine and discuss techniques we use to ensure real-time performance. Special attention will be given to our solutions for wheel-ground interaction, soil deformation, and cable modeling, along with some related open research problems.