Guest Editor's Introduction: Special Section on the ACM SIGGRAPH/Eurographics Symposium on Computer Animation (SCA)

Florence Bertails-Descoubes and Stelian Coros

THIS special section features expanded versions of three of the best papers from the 14th Annual ACM SIGGRAPH/Eurographics Symposium on Computer Animation (SCA 2015), which was held in Los Angeles, California on August 7-9, 2015. In its 14th year of presence, SCA has been established as the premier venue specifically dedicated to the dissemination of innovative research in the field of computer animation.

SCA 2015 received 60 complete submissions. Each submission received three or four reviews from members of the international program committee. The 67 members of the program committee subsequently engaged in a thorough online discussion that converged on acceptance decisions for twenty (20) full-length papers. The Awards Committee selected three Best Paper awards, based on the original reviews and the conference presentations. The papers presented at SCA 2015 reflected exciting scholarly work in a broad spectrum of topics including character animation, physics-based simulation, control techniques and mechanical characters, among others. We are excited to feature extended versions of three of the top papers presented in the Symposium; each invited paper contains at a minimum 35 percent original material compared to the version presented at SCA 2015.

The first paper, "Learning Inverse Rig Mappings by Nonlinear Regression" addresses a problem of significant importance in Computer Animation. Professional animators use sophisticated animation rigs to map a relatively small set of user-defined parameters to deformations of a character's geometric mesh. The inverse of this map, however, is equally useful, as it allows rig parameters to automatically be infered from character motions that are created using physically-based simulation or motion capture technology. The authors propose a general, real-time solution to the inversion of rig functions through data-driven nonlinear regression. This work promises to improve the productivity of professional animators, while providing full control and artistic freedom.

The second paper, "Functional Thin Films on Surfaces", pushes the limits of the range of natural phenomena that can be simulated in Computer Graphics. It tackles the challenging problem of capturing the motion of viscous thin film flows on a curved surface, such as wine droplets slowly flowing inside a glass. Relying on an efficient and robust variational integrator adapted to arbitrary triangulated meshes, the method is able to capture fascinating thin liquid phenomena such as fingering, droplet formation, interaction between droplets, and pearling.

The third paper, "Divergence-Free SPH for Incompressible and Viscous Fluids", deals with a very active research problem in Computer Animation: that of simulating incompressible fluids using the Smoothed Particle Hydrodynamics (SPH) approach. SPH is a meshless Lagrangian approach which proves attractive for Computer Graphics as it allows to track complex fluid features in an efficient and accurate manner, relying only on a finite set of neighboring interactions between particles. However, within this formalism, enforcing incompressibility is difficult to achieve. This paper proposes a new implicit solver, both for enforcing a divergence-free flow, and for eliminating density deviations due to numerical errors. The method proves to perform orders of magnitude faster compared to previous approaches, and nicely extends to the simulation of highly viscous fluids such as honey or mud.

The guest editors are grateful to the *IEEE Transactions on Visualization and Computer Graphics* regular editors for providing this special section, and the exposure opportunity it offers for the work published at SCA 2015. They would like to express gratitude to all members of the international program committee for their professionalism and hard work, and also thank the other members of the organizing committee, Jernej Barbic, Zhigang Deng and Shinjiro Sueda, for helping to make this event a success.

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Digital Object Identifier no. 10.1109/TVCG.2016.2638546

Florence Bertails-Descoubes is a full-time researcher at Inria in Grenoble, France. She received in 2002 a MSc in Image, Vision and Robotics and completed in 2006 a PhD on hair simulation at INP Grenoble, which was awarded the national SPECIF prize from the French community in Computer Science. In 2006-2007, F. Bertails-Descoubes worked at the University of British Columbia as a postdoctoral researcher before joining Inria in September 2007 as a permanent researcher in Grenoble. Her research interests deal with the modeling and the simulation of complex mechanical objects, mainly for computer graphics and virtual prototyping applications. In particular, she is interested in the modeling of nonlinear slender structures (rods, plates), the handling of contacts with friction for modeling heterogeneous materials (such as hair or granulars), and the control of physical simulators. She has received in 2015 a starting grant from the European Research Council to work on the inverse modeling of slender structures in the presence of frictional contact. F. Bertails-Descoubes regularly presents her work at premier international conferences in Computer Graphics such as ACM SIGGRAPH or Eurographics, and maintains strong collaborations with industrial partners from the fields of cosmetology and virtual entertainment.

Stelian Coros is an Assistant Professor in the Robotics Institute at Carnegie Mellon University. He received his PhD in Computer Science from the University of British Columbia in 2011. His doctoral dissertation was awarded the Alain Fournier PhD Dissertation Annual Award. Prior to joining CMU, he was a Research Scientist working in the Disney Research, Zurich lab. Through his work, Dr. Coros strives to develop fundamental computational models for motor control, motion planning, physical simulation and computational fabrication. For his work in these areas, Dr Coros was awarded an Intel Early Career Faculty Award in 2016.