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

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THIS special section features expanded versions of four of the best papers from the 13th Annual ACM SIGGRAPH/Eurographics Symposium on Computer Animation (SCA 2014), which was held in Copenhagen, Denmark from 21-23 July 2014. In its thirteenth 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 2014 received 47 submissions and each submission received four reviews from members of the international program committee. The 59 members of the program committee subsequently engaged in a thorough online discussion that converged on acceptance decisions for eighteen (18) full-length papers and two (2) additional accepted papers in the short (six-page) format. The oral presentation schedule at the Symposium featured all full and short papers, in addition to four invited presentations from recently published papers in the *IEEE Transactions on Visualization and Computer Graphics*. The Award Selection Committee selected one Best Paper and two Honorable Mentions among the 20 (full and short) accepted papers, based on the original reviews and the conference presentations. The papers presented at SCA 2014 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 four of the top papers presented in the Symposium; each invited paper contains at a minimum 35 percent original material from the version presented at SCA 2014.

The first paper, "Optimization Integrator for Large Time Steps" addresses the significant robustness challenges that Newton's method is confronted with when called upon to solve large systems of nonlinear equations using aggressive time steps, as often desired in performance-conscious animation applications. The authors recast an implicit integration scheme as an optimization problem, and demonstrate robust dynamic integration even when taking a single time integration step per frame of a 24 fps simulation. The authors propose novel penalty collision formulations for self-collisions and collisions against scripted bodies, and demonstrate the efficacy of their solver in Material Point Method (MPM) simulations.

The second paper, "Coupling 3D Eulerian, Heightfield and Particle Methods for the Interactive Simulation of Large Scale Liquid Phenomena" proposes a new method to simulate large bodies of water by combining particle, 3D grid and height field methods. The authors maintain a hybrid representation of water near the surface with both particles and a grid, and switch between representations during the course of the simulation. For open scenes, water outside of the 3D grid domain is simulated via the Shallow Water Equations on a height field and the two domains are coupled such that waves can travel naturally across the border. The authors showcase various scenarios including a whale breaching simulation, all running in real-time or at interactive rates.

The third paper, "Stable Anisotropic Materials" caters to the design of constitutive laws for virtual materials with pronounced anisotropic traits (wood, plants, muscles) that are becoming very common in current and emerging applications of physics-based modeling. The authors investigate linear orthotropic materials, a special class of linear anisotropic materials where the shear stresses are decoupled from normal stresses. Although orthotropic materials are parameterized by nine values that can be un-intuitive to tune in practice, the authors propose a user-friendly approach to setting these parameters that is guaranteed to be stable. The authors also derive a stability condition for a subset of general linear anisotropic materials, and give intuitive approaches to tuning them.

The fourth paper, "View-Dependent Adaptive Cloth Simulation with Buckling Compensation," describes a method for view-dependent cloth simulation using dynamically adaptive mesh refinement and coarsening. The method adjusts the criteria controlling refinement to account for visibility and apparent size in the camera's view. The appearance of detailed cloth is preserved throughout the animation without wasting their effort on details indiscernible to the viewer. Computational savings increase as scene complexity grows. The approach produces a two-fold speed-up for a single character and more than $4\times$ for a small group as compared to view-independent adaptive simulations, and respectively $5\times$ and $9\times$ speed-ups as compared to non-adaptive simulations.

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for their professionalism and hard work, and also thank the other members of the organizing committee, Kenny Erleben, Julien Pettré and Jack Wang, for helping making this event a success.

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Guest Editors

Eftychios Sifakis received the PhD degree in computer science from Stanford University in 2007, and served as a postdoctoral researcher at the University of California, Los Angeles between 2007-2010. He is an assistant professor of computer sciences at the University of Wisconsin-Madison. His research concentrates on modeling and simulation of virtual materials, with particular emphasis on models of the human anatomy and applications in animation, biomechanics and virtual surgery. He received the National Science Foundation CAREER Award in 2012.

Vladlen Koltun received the PhD degree in 2002 for new results in theoretical computational geometry. He spent three years at UC Berkeley as a postdoc in the theory group and joined the Stanford Computer Science department in 2005 as a full-time faculty member working in theoretical computer science. He switched to applied research in visual computing in 2007 and joined Intel Labs in 2015. He currently directs the Intel Visual Computing Lab.