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

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THIS special section presents expanded versions of three of the best papers from the 11th Annual ACM SIGGRAPH/Eurographics Symposium on Computer Animation (SCA 2012), which was held in Lausanne, Switzerland, from 29-31 July 2012. SCA has established itself as the premier conference dedicated specifically to innovations in the software and technology of computer animation.

SCA 2012 received 80 submissions and each submission was reviewed by at least three members of the international program committee. After a thorough online discussion, the 72-member international program committee decided on the 27 full papers and nine short presentation papers accepted for the final program. Out of 27 full papers, the symposium's Best Papers Award Committee selected one best paper, two runner-ups, and four honorable mentions. The selection was informed by the original reviews and the conference presentations. We are delighted to present three out of the six very best papers of SCA 2012 invited for this special section. Each of the invited papers contains a minimum of 30 percent new material and received at least three reviews, including one reviewer not among the original SCA reviewers.

The first paper, "Multiphase Flow of Immiscible Fluids on Unstructured Moving Meshes," tackles the simulation of multiphase flow of immiscible fluids using unstructured moving meshes. The underlying discretization, the deformable simplicial complex (DSC), offers an unstructured, moving computational grid, trading the apparent simplicity of the level set method for robustness and support of multiple phases. Specifically, the paper presents the second-order surface energy approximation, pressure stabilization through finite volume discretization of the pseudo-compressibility equation, simplification of the solid boundary conditions, support of multiple, immiscible fluids, a preconditioner for employing a GPU-based, iterative solver, and the performance optimization of the DSC method.

Mass and volume conservation is an important problem in liquid simulation. The problem is relatively easy if the simulation uses Lagrangian particles or triangle meshes. The problem is more challenging with GPU-friendly Eulerian liquid simulation. The second paper, "Mass-Conserving Eulerian Liquid Simulation," presents a purely Eulerian liquid simulator that conserves mass locally and globally without any need for Lagrangian components. The paper also discusses useful techniques including a sharpening method for steepening the transition between liquid and air, a modification of the conservative advection method, handling of nonaxis aligned and moving solid boundaries, and a super resolution method to bring out subgrid detail.

The third paper, "Fast Collision Detection for Fracturing Rigid Bodies," addresses collision detection among stiff objects undergoing brittle fracture. The paper presents an efficient collision detection method based on well-known acceleration data structures such as distance fields and sphere trees. The technical challenge is the handling of topology changes of fracturing rigid bodies, which requires incremental updates of the acceleration data structures at runtime. Specifically, two acceleration methods are discussed in the paper. Both reconfigurable distance fields and augmented sphere tree data structures are well suited for fast updates under fracture events.

We would like to thank the international program committee and the reviewers of these three extended submissions for providing detailed and thoughtful feedback that helped ensure the quality of the final papers. We would also like to thank the symposium cochairs, Ronan Boulic and Taku Komura, for making the symposium a great success. We must also thank all of the authors for submitting their work, for supporting the symposium, and for contributing their efforts, insights, and original ideas. We are grateful to the *IEEE Transactions on Visualization and Computer Graphics* for providing this special section to showcase the work published at SCA 2012 and hope that you enjoy and learn from the papers as much as we did.

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