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Editorial

Foreword to the Special Section on Shape Modelling International 2019

Shape Modelling International (SMI) promotes the dissemination of new mathematical theories and novel computational techniques for modelling, simulating, and processing digital shape representations. Launched in 1997 by Prof. Tosyiasu L. Kunii, SMI is in its 20th anniversary, and proudly gathers a wide community of researchers, developers, practitioners, and students in academia and industry from all over the world. In the realm of Computer Graphics conferences, SMI is characterized by its particular focus on methods and techniques to model, design and analyse shapes in all their aspects. The scientific focus of SMI evolved over time, and emerging topics, such as shape semantics, shape similarity, and fabrication, have been introduced. In particular, this year there were several papers dealing with deep learning in shape understanding.

Starting from 2001, the SMI conference became an annual event with the venue rotating in turn among Asia, Europe and America: Italy (2001), Canada (2002), South Korea (2003), Italy (2004), USA (2005), Japan (2006), France (2007), USA (2008), China (2009), France (2010), Israel (2011), USA (2012), UK (2013), Hong Kong (2014), France (2015), Germany (2016), USA (2017), Portugal (2018).

SMI has a tradition in seeking co-location with other conferences: in 2004, it was organized for the first time with the ACM Symposium on Solid and Physical Modelling (SPM); in 2016, it was held in conjunction with both SPM and the Symposium on Geometry Processing, as part of the first International Geometry Summit (IGS). In line with this tradition, SMI 2019 will be co-located with the second *International Geometry Summit (IGS2019)*, organized in Vancouver, Canada (17–21 June, 2019).

The technical papers track for SMI'19 received a total of 51 paper submissions, and *21 full papers* were *accepted for publication* in this special issue of Computer and Graphics devoted to the Proceedings of SMI. Each paper received from three to five reviews from members of the International Program Committee, and underwent a two-stage review process. An additional paper, which was previously published in a regular issue of *Computers and Graphics* but not presented at a conference, was invited to be part of SMI'19 technical program. There was also a presentation of an invited TVCG paper: *Physics-Based Quadratic Deformation Using Elastic Weighting*, Ran Luo, Weiwei Xu, Huamin Wang, Kun Zhou, Yin Yang. All 22 Computers and Graphics papers were orally presented at the Conference grouped into themed sessions as follows:

1. Solids and volumes

- Efficient slicing of Catmull–Clark solids for 3D printed objects with functionally graded material [1].
- Delaunay lofts: a biologically inspired approach for modelling space filling modular structures [2].
- Generalized volumetric foliation from inverted viscous flow [3].
- Extended virtual pipes for the stable and real-time simulation of small-scale shallow water [4], (invited C&G paper).
- Robust edge topology construction for Voronoi diagrams of spheres [5].

2. Curves, surfaces and meshes

- Representation of NURBS surfaces by controlled iterated functions system automata [6].
- Multiscale NURBS curves on the sphere and ellipsoid [7].
- Boundary conforming mesh to T-NURCC surface conversion [8].
- Refinable smooth surfaces for locally quad-dominant meshes with T-gons [9].

3. Shape fairing

- Trimming offset surface self-intersections around near-singular regions [10].
- Denoising of dynamic 3D meshes via low-rank spectral analysis [11].
- Extraction of coherent and smooth feature lines from meshes with fine details [12].
- Practical error-bounded remeshing by adaptive refinement [13].

4. Shape editing and design

- Real-time editing of man-made mesh models under geometric constraints [14].
- Physics-based quadratic deformation using elastic weighting [15], (invited TVCG paper).
- Combining Voxel and Normal Predictions for Multi-View 3D Sketching [16].
- Nested explorative maps: a new 3D canvas for conceptual design in architecture [17].
- Anisotropic convolution surfaces [18].

5. Shape analysis and matching

- Partial correspondence of 3D shapes using properties of the nearest-neighbour field [19].
- A kernel for multi-parameter persistent homology [20].

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- Learning multi-view manifold for single image-based modelling [21].
- Automatic craniofacial registration based on radial curves [22].
- Efficient 4D shape completion from sparse samples via cubic spline fitting in linear rotation-invariant space [23].

Three outstanding *keynote speakers* further enriched SMI'19 program

- *Holly Rushmeier,* Yale University, new projects in modelling shape and appearance;.
- *Scott Schaefer,* Texas A&M University, bijective parameterisation;.
- *Alec Jacobson,* University of Toronto, geometry processing in the wild.

In addition, SMI2019 hosted the *Fabrication and Sculpting Event (FASE2019)*, chaired by Ergun Akleman, Texas A&M University, and Karina Rodriguez Echavarria, University of Brighton, which originated with SMI several years ago and is now featured as an independent component of the Symposium.

SMI'19 is held in-cooperation with ACM/SIGGRAPH and EUROGRAPHICS and received financial sponsorship from Elsevier for The Best Paper Award. This Award was given to *A Kernel for Multi-Parameter Persistent Homology* and the honourable mentions were *Generalized Volumetric Foliation from Inverted Viscous Flow* and *Partial Correspondence of 3D Shapes using Properties of the Nearest-Neighbor Field*. The SMI'19 Program Chairs wish to acknowledge all the people who contributed to the successful organization of the program and conference: in particular, the *SMI Steering Committee, Joaquim Jorge* the Elsevier *Computers and Graphics* Editor in Chief, the *Elsevier CAG Team* (Ross Laman, Damien Rohmer, Qian Jiao), the *IGS2019 Chairs* (Konrad Polthier, Wenping Wang, Richard Zhang). We would also like to thank all the members of the *SMI2019 International Program Committee and additional Reviewers*.

6. SMI2019 conference chairs

- Loic Barthe (University of Toulouse, France).
- Ye Duan (University of Missouri, USA).
- KangKang Yin (Simon Fraser University, Canada).

7. SMI2019 program chairs

- Raphaëlle Chaine (University of Lyon, France).
- Giuseppe Patanè (CNR, Italy).

SMI 2019 program committee

Valery Adzhiev (Bournemouth University).
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Sylvain Lefebvre (INRIA Nancy Grand-Est).
Xin Li (Louisiana State University).
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Ligang Liu (USTC).
Linjie Luo (Snap Research).
Chongyang Ma (Snap Research).
Nicolas Mellado (CNRS, Toulouse).
Serena Morigi (University of Bologna).
Geraldine Morin (University of Toulouse).
Ahmad Nasri (Boulder Graphics LLC).
Matthias Niessner (TU München).
Yutaka Ohtake (University of Tokyo).
Alexander Pasko (Skoltech, Russia; Bournemouth University, UK).
Jorg Peters (University of Florida).
Konrad Polthier (Freie Universitat Berlin).
Roi Poranne (ETHZ).
Hong Qin (SUNY Stony Brook).
Damien Rohmer (Ecole Polytechnique, Paris).
Raif Rustamov (AT&T Labs Research).
Manolis Savva (Princeton University).
Michela Spagnuolo (CNR-IMATI).
Carlo Sequin (UC Berkeley).
Alla Sheffer (University of British Columbia).
Karan Singh (University of Toronto).
Mélina Skouras (INRIA Grenoble).
Justin Solomon (MIT).
Hao Su (University of California-San Diego).
Chengcheng Tang (Facebook Reality Labs).
Kai Tang (Hong Kong Univeristy of Science and Technology).
Daniel Thalmann (Swiss Federal Institute of Technology).
Yiying Tong (Michigan State University,).
Georg Umlauf (HTWG Konstanz).
Remco Veltkamp (Utrecht University).
Wenping Wang (University of Hong Kong).
Michael Wimmer (TU Wien).
Kai Xu (National University of Defense Technology).
Ersin Yumer (UBER ATG).

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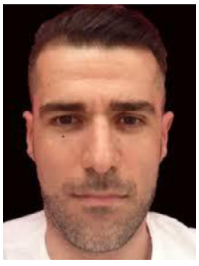
Raphaëlle Chaine's research interests include geometry processing and 3D geometric modeling. After completing her PhD in computer science, in the domain of point set surfaces segmentation, Raphaëlle joined Prismes Geometrica team at INRIA Sophia Antipolis as the *Université de Nice* hired her as an associate professor. During 3 years, she focused her work on 3D reconstruction and computational geometry. Since 2003, Raphaëlle is now involved in the LIRIS (CNRS) research laboratory and she was promoted to professor in Computer Science in 2013 at the University of Lyon 1. There, she works on the issues raised by the generation of quality meshes from scanner data, and by the compression of those models. This involves the analysis and the processing of point set data raised by scanners. More recently, she developed an interest in detecting auto-similarities in shapes as well as developing dictionaries and basis for local description of surfaces. Raphaëlle also deals with the interactive modeling of virtual objects through virtual sculpting. She graduated with an engineer degree of the "Ecole Centrale" of Lyon, with a third year specialization in Applied Mathematics at the "Ecole Centrale" of Paris in France.



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