



Editorial

Foreword to the special issue on Shape Modeling International 2022 (SMI2022)

This special section of Computers & Graphics (C&G), features the full papers presented at the Shape Modeling International conference — SMI 2022 (<https://smiconf.github.io/2022/>). Due to the pandemic, and for the second year in a row, SMI was convened online. SMI 2022 was co-located with Solid and Physical Modeling (SPM 2022) and the Fabrication and Sculpting Event (SCULPT), see Fig. 1. SMI 2022 was hosted by Nanyang Technological University, Singapore on June 27–29, 2022.

Shape Modeling International (SMI 2022) provides an international forum for the dissemination of new mathematical theories and computational techniques for modeling, simulating, and processing digital representations of shapes and their properties to a community of researchers, developers, students, and practitioners across a wide range of fields. SMI 2022 also organized a panel session called “Implicit Surface History Event”, where the invited pioneers discussed important milestones of subdivision techniques and introduced the human element and insights behind the discoveries. The panel session received high praise from the attendees.

This year, we were pleased to have two keynote lectures at SMI2022: (i) Prof. Philippe Block (*Institute of Technology in Architecture (ITA) at ETH Zurich*) and Shajay Bhooshan Zaha Hadid Architects, UK; (ii) Prof. Mirela Ben-Chen (*Center for Graphics and Geometric Computing of the CS Department at the TECHNION, IL*). SMI 2022 also featured two award talks, namely, the Toshiyasu Kunii award and the SMI young investigator award. Dr. Marie-Paule Cani (*Professor of Computer Science at Ecole Polytechnique, Grenoble, France*) and Dr. Teseo Schneider (*Assistant Professor in Computer Science at the University of Victoria, Canada*). These excellent keynotes and talks cover the latest advances and novel applications of shape modeling and computational design.

The full paper submission track followed a 2-stage review process and each paper was assessed by 4 reviewers on average. The accepted papers were published directly in Computers & Graphics. Of the 24 papers submitted to the full paper track 10 were accepted for publication in Computers & Graphics; two of these papers applied and received the *Replicability Badge* issued by the Graphics Replicability Stamp Initiative (GRSI).

Full papers are available at <https://www.sciencedirect.com/journal/computers-and-graphics/special-issues>. These works cover a variety of topics, including geometric modeling, inverse solid and surface modeling, surface and scene reconstruction, dynamic surface and deformation, 3D registration, geometric computing, 3D retrieval, 3D analysis, and generation. All accepted papers and invited talks were orally presented online and



Fig. 1. Sculptures by SCUPT keynote speaker Nick Ervinck.

grouped into the following themed sessions. A best paper award was presented during the closing ceremony.

The following papers were presented:

- **Connectivity-guaranteed porous synthesis in free form model by persistent homology**, Depeng Gao, Jinhao Chen, Zhetong Dong, Hongwei Lin, [1].
- **Seamless simplification of multi-chart textured meshes with adaptively updated correspondence**, Wenjing Zhang, Jianmin Zheng, Yiyu Cai, Anders Ynnerman, [2].
- **Localized remeshing for polyhedral splines**, Kęstutis Karčiauskas, Jörg Peters, [3].
- **Closed-form quadrangulation of n-sided patches**, Marco Tarini, [4].
- **Controllable blending of line and polygon skeleton-based convolution surfaces with finite support kernels**, Xiaoqiang Zhu, Qi Chen, Sihui Liu, Chenjie Fan, Chenze Song, Junjie Zhang, Dan Zeng, Xiaogang Jin, [5].
- **Simultaneous 3D dithering of multiple images by curves**, Gershon Elber, [6].
- **Automated generation of flat tileable patterns and 3D reduced model simulation**, Iason Manolas, Francesco Laccone, Gianmarco Cherchi, Luigi Malomo, Paolo Cignoni, [7].
- **A parallel algorithm for computing Voronoi diagram of a set of spheres using restricted lower envelope approach and topology matching**, Manoj Kumar Mukundan, Safeer Babu Thayyil, Ramathan Muthuganapathy, [8].

- **CloudWalker: Random walks for 3D point cloud shape analysis**, Adi Mesika, Yizhak Ben-Shabat, Ayellet Tal, [9]. **[Replicability stamp]**
- **Query-replace operations for topologically controlled 3D mesh editing**, Guillaume Damiand, Vincent Nivoliors, [10]. **[Best paper and replicability stamp]**

Keynotes

- Philippe Block (ETH Zurich, Switzerland) and Shajay Bhooshan (Zaha Hadid Architects, UK), *The Structural Geometry of 3D Concrete Printing*.
- Mirela Ben-Chen, TECHNION-Israel Institute of Technology, Israel, *Material-driven Realization of 3D Surfaces*.

Award Talks

- Marie-Paule Cani, Ecole Polytechnique, France, *Turning 3D Virtual Worlds Into Interactive Scientific Test-beds*.
- Teseo Schneider, University of Victoria, Canada, *Robust Black-box Analysis*.

Implicit Surface History Event

- (Before 1990) Early Days of Implicit Surfaces. *Panelists: Malcolm Sabin, Vadim Shapiro, Jim Blinn, Alan H. Barr, Brian Wyvill, Geoff Wyvill*
- (1990–2000) Applications. *Panelists: Marie-Paule Cani, John Hart, Mathieu Desbrun, Brian Wyvill, John Hughes, Valery Adzhiev, Karan Singh, Ergun Akleman*.
- (New Millenium) Mainstream & Beyond. *Panelists: Loïc Barthe, Marco Tarini, George Allen*.

We would like to thank the 71 IPC members for their reviewing efforts, which helped us to create a high-quality program and led to the success of this special section. We are grateful to all panelists, our conference co-chairs Stefanie Hahmann, Ying He and Yang Liu, SCULPT chairs Matias del Campo, Oleg Fryazinov and Carlo H. Séquin, for their help and support in numerous aspects and to Ergun Akleman who supervised the SMI organization. We also thank the Eurographics and ACM Associations for their continued support, the Nanyang Technological University in Singapore for hosting the virtual event, and Joaquim Jorge, editor-in-chief of C&G and the Elsevier CAG Team for making this C&G Special Section possible. Finally, we greatly appreciate all authors for their interest and support to SMI 2022.

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