

Foreword

Architecture and geometry have always been intrinsically linked. However, their operational relationship has been dramatically strengthened by the recent advent of computational design and digital fabrication techniques. These distinct developments are reciprocally dependent, as the digital fabrication of complex architectural components induces the need for advanced geometric strategies, and in return the potentials of geometrical computing instils a need for efficiency in the production of complex forms. Although currently confined to the exclusive domain of specialists, such advanced geometric practices shall evolve to include a much larger and interdisciplinary professional group, including architects, engineers, computer scientists, and mathematicians. Their authorship in the creative development of specific computational tools may revolutionise the design process, all the way from initial conceptual form finding to its final fabrication and construction.

The recent passing of Zaha Hadid led to speculation that this unexpected event could herald the decline of complex form in architecture. This conjecture may be amplified by the current accumulation of global political, social, and environmental emergencies demanding fast and pragmatic architectural solutions rather than extravagant shapes; however, this critical assumption proves to be short-sighted and simplistic. As a matter of fact, geometrical complexity remains the precondition for efficient structures in architecture, and this simple paradigm can be observed in nature, beyond time-dependent stylistic and formal discourse.

Since its first edition, which was organized by Helmut Pottmann in 2008, the aim of the Advances in Architectural Geometry symposium has been to propel this research area by providing a platform for interdisciplinary debate through scientific contributions of both technical and theoretical nature. Such development of easy and elegant access to complex geometries in architecture not only demands radical progress in computational design tools and digital fabrication techniques, but primarily depends on the emergence of a novel design culture and building craft.

It is a special honour for the National Centre of Competence in Research (NCCR) Digital Fabrication to welcome the AAG community to ETH Zurich for the 2016 edition of the conference. While the workshops and the paper presentations remain the core events of the AAG symposium, the NCCR Digital Fabrication is proud of the five exceptional keynote speakers who have kindly accepted our invitation and enrich this edition with their contributions. Lord Norman Forster, who lectures together with his partner Francis Aish, represents more than half a century of persistent architectural innovation and provides a long-term perspective

on the relationship between architecture and technology. Werner Sobek, whose practice operates at the interface between architecture and engineering, contributes with his expertise in lightweight constructions and his interest in performative structures. Complementary to these highly recognised professionals, Erik Demaine and Urs B. Roth contribute distinct perspectives on geometry. While they share a deep mathematical understanding and a passion for surprising “geometric discoveries”, their work methods are diametrically opposed. Erik Demaine develops his origami sculptures by engaging with computational algorithmic techniques, whereas Urs. B. Roth’s heuristic search for form developed using sequences of accurate drawings and rigorous formulas that create their own peculiar aesthetic. Interesting enough, though, both consider themselves to be artists in addition to being scientists.

The peer-review process for the selection of papers was managed by the scientific co-chairs, covering the domains of architecture, structural engineering, mathematics, and computer science, with the support of the scientific committee and the AAG2106 coordinator. From a very large pool of submissions, 22 papers have been accepted and included in the present proceedings. In addition, 25 posters have also been accepted for presentation, and the workshop chair has selected 12 workshop proposals for the pre-conference sessions. We extend our thanks and acknowledgements to all authors, tutors, reviewers, and organisers for their invaluable contributions to this process.

External industry partners are vital to both the integrity and the execution of such a large conference. We are very pleased to have strong and highly supportive partners and industry sponsors for the AAG2016. We would like to especially thank our main sponsor ABB, our workshops sponsor Autodesk, and the conference sponsors Moog, Waagner Biro, ERNE, Evolute, Absolute Joint System, and Disney Research for their backing and guidance.

Finally, we would also like to thank our colleagues and co-hosts at the Institute for Technology in Architecture (ITA), the Department of Architecture, and the ETH Zurich for their ongoing support and for providing the conference venues. We hope that you enjoy your time visiting ETH and Zurich, and wish you an excellent conference.

Sigrid Adriaenssens, Achim Menges, Mark Pauly (Scientific Co-Chairs)

Dave Pigram (Workshop Chair)

Fabio Gramazio, Matthias Kohler (Conference Chairs)

Orkun Kasap, Russell Loveridge (Organisers)