GMP 2017

INTERNATIONAL CONFERENCE ON
GEOMETRIC MODELING AND PROCESSING

PROGRAM GUIDE

April 17-19 Xiamen, China

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Monday, April 17, 2017

08:45 – 09:00	**Opening Remarks** (chair: **Ligang Liu**)
09:00 – 10:00	**Keynote 1** (chair: **Ligang Liu**)
	Boundary-sensitive Hodge Decompositions **Konrad Polthier**
10:00 – 10:30	Coffee Break
10:30 – 12:00 **Session 1** chair: **Kai Hormann**	*Towards Optimal Advection using Stretch-maximizing Stream Surfaces* **Michael Bartoň** and Jiří Kosinka
	Dense Packing of Congruent Circles in Free-form Non-convex Containers **Jinesh Machchhar** and Gershon Elber
	An Algebraic Framework for Computing the Topology of Offsets to Rational Curves **Laureano Gonzalez-Vega**, Gema M. Diaz-Toca, Mario Fioravanti, Ioana Necula and Jorge Caravantes
12:00 – 14:00	Lunch Break
14:00 – 15:30 **Session 2** chair: **Ying He**	*Algorithms for Computing Strong μ-Bases for Rational Tensor Product Surfaces* Liyong Shen and **Ron Goldman**
	Optimal Base Complexes for Quadrilateral Meshes **Faniry Razafindrazaka** and Konrad Polthier
	Dimension and Basis Construction for Analysis-suitable G^1 Two-patch Parameterizations **Mario Kapl**, Giancarlo Sangalli and Thomas Takacs
15:30 – 16:00	Coffee Break
16:00 – 17:30 **Session 3** chair: **Xin Li**	*Adaptive Scattered Data Fitting by Extension of Local Approximations to Hierarchical Splines* **Cesare Bracco**, Carlotta Giannelli and Alessandra Sestini
	Smooth Splines on Quad Meshes with 4-split Macro-patch Elements **Ahmed Blidia**, Bernard Mourrain and Nelly Villamizar
	Discretizing Wachspress Kernels is Safe **Kai Hormann** and Jiří Kosinka
18:00 – night	Banquet Dinner (Location: Honor Seafood Restaurant; **Leave at 17:40**)

Tuesday, April 18, 2017

09:00 – 10:00	**Keynote 2** (chair: **Bert Jüttler**)
	Volumetric T-Spline Parameterization for Isogeometric Analysis with Engineering Applications **Yongjie Jessica Zhang**
10:00 – 10:30	Coffee Break
10:30 – 12:00 **Session 4** chair: **Juyong Zhang**	*Converting a CAD Model into a Non-uniform Subdivision Surface* (CAGD) Jingjing Shen, **Jiří Kosinka**, Malcolm Sabin, Neil Dodgson
	Implicit Surface Reconstruction with Total Variation Regularization **Yuan Liu**, Yanzhi Song, Zhouwang Yang and Jiansong Deng
	Phase-field Guided Surface Reconstruction Based on Implicit Hierarchical B-splines **Maodong Pan**, Weihua Tong and Falai Chen
12:00 – 14:00	Lunch Break
14:00 – 15:30 **Session 5** chair: **Li-Yong Shen**	*Curvature Sensitive Analysis of Axially Compressed Cylindrical Tubes with Corrugated Surface using Isogeometric Analysis and Experiment* (CAGD) Takuma Imai, Tadahiro Shibutani, Kazumi Matsui, Seitoku Kumagai, Dang Tien Tran, Kaiyuan Mu, **Takashi Maekawa**
	Convergence Rates for Solving Elliptic Boundary Value Problems with Singular Parameterizations in Isogeometric Analysis **Meng Wu**, Yicao Wang, Bernard Mourrain, Boniface Nkonga and Changzheng Cheng
	Rapid B-Rep Model Preprocessing for Immersogeometric Analysis using Analytic Surfaces **Chenglong Wang**, Fei Xu, Ming-Chen Hsu and Adarsh Krishnamurthy
15:30 – 16:00	Coffee Break
16:00 – 17:00 **Session 6** chair: **Zhibin Niu**	*Surface Reconstruction using Simplex Splines on Feature-sensitive Configurations* (CAGD) **Yuhua Zhang**, Juan Cao, Zhonggui Chen, Xiaoming Zeng
	Greville Abscissae of Totally Positive Bases (CAGD) Jesús M. Carnicer, **Esmeralda Mainar**, Juan Manuel Peña.
17:30 - 20:30	Visit to Zeng Cuo An (Dinner on your own; **Leave at 17:10**)

Wednesday, April 19, 2017

09:00 – 10:00	**Keynote 3 (**chair: **Yong-Jin Liu**)
	What You Think is What You See -- Smart Geometry Modeling and Processing **Yang Liu**
10:00 – 10:30	Coffee Break
10:30 – 12:00 **Session 7** chair: **Dun Liang**	*Blended Barycentric Coordinates* **Dmitry Anisimov**, Daniele Panozzo and Kai Hormann
	On Pseudo-harmonic Barycentric Coordinates **Renjie Chen** and Craig Gotsman
	Rapid Blending of Closed Curves Based on Curvature Flow **Masahiro Hirano**, Yoshihiro Watanabe and Masatoshi Ishikawa
12:00 – 14:00	Lunch Break
14:00 – 15:30 **Session 8** chair: **Xiaohong Jia**	*A Primitive-based 3D Segmentation Algorithm for CAD Models* Truc Le and **Ye Duan**
	Sliver-Suppressing Tetrahedral Mesh Optimization with Gradient-Based Shape Matching Energy Saifeng Ni, Zichun Zhong, **Yang Liu**, Wenping Wang, Zhonggui Chen and Xiaohu Guo
	Discrete Geodesic Graph (DGG) for Computing Geodesic Distances on Polyhedral Surfaces Xiaoning Wang, Zheng Fang, Jiajun Wu, Shi-Qing Xin and **Ying He**
15:30 – 16:00	Coffee Break
16:00 – 17:30 **Session 9** chair: **Dongming Yan**	*Smooth Interpolation of Key Frames in a Riemannian Shell Space* **Pascal Huber**, Ricardo Perl and Martin Rumpf
	Compressed Vibration Modes of Deformable Objects **Christopher Brandt** and Klaus Hildebrandt
	By Example Synthesis of Three-Dimensional Porous Materials **Hui Zhang**, Weikai Chen, Bin Wang and Wenping Wang
17:30 – 17:40	**Closing Ceremony** (chair: **Zhonggui Chen**)

Konrad Polthier
Freie Universität Berlin, Germany

Brief Biography

Konrad Polthier is full professor of mathematics at Freie Universität Berlin since 2005. He received his PhD from University of Bonn in 1994, and headed research groups a Technische Universität Berlin and Zuse Institute Berlin before joining FU Berlin. His research focuses on discrete differential geometry, applied geometry, geometry processing and mathematical visualization. Results from him have been applied in industry such as computer graphics, computer aided design and architecture. Dr. Polthier has written and co-edited books on mathematical visualization and produced mathematical video films. His video MESH – A Journey through Discrete Geometry (www.mesh-film.de, joint with Beau Janzen, Los Angeles) has received international awards including "Best Animation" at the New York International Independent Film Festival. Polthier served as conference chair on international conferences including ACM/Eurographics Symposium on Geometry Processing and SIAM Geometric Design. His professional positions include chair of the Berlin Mathematical School, board member of the Matheon research center and chair of the Berlin Mathematical Society. Since May 2014 he serves as co-editor in chief of Computer Aided Geometric Design.

For more details see: http://www.polthier.info/

Boundary-sensitive Hodge Decompositions

Abstract

We provide a theoretical framework for discrete Hodge-type decomposition theorems of piecewise constant vector fields on simplicial surfaces with boundary that is structurally consistent with decomposition results for differential forms on smooth manifolds with boundary. In particular, we obtain a discrete Hodge-Morrey-Friedrichs decomposition with subspaces of discrete harmonic Neumann fields h,N and Dirichlet fields h,D, which are representatives of absolute and relative cohomology and therefore directly linked to the underlying topology of the surface. In addition, we discretize a recent result that provides a further refinement of the spaces h,N and h,D, and answer the question in which case one can hope for a complete orthogonal decomposition involving both spaces at the same time.

Exciting open questions are related to the so-called Poincaré-angle which appears as a feature of the decomposition on surfaces with positive genus. As applications, we present a simple strategy based on iterated L^2-projections to compute refined Hodge-type decompositions of vector fields on surfaces, which gives a more detailed insight than previous decompositions. As a proof of concept, we explicitly compute harmonic basis fields for the various significant subspaces and provide exemplary decompositions for two synthetic vector fields. All techniques are essential for vector field analysis, surface parametrization, remeshing and others. We will show several applications.

Yongjie Jessica Zhang
Carnegie Mellon University, USA

Brief Biography

Yongjie Jessica Zhang is a Professor in Mechanical Engineering at Carnegie Mellon University with a courtesy appointment in Biomedical Engineering. She received her B.Eng. in Automotive Engineering, and M.Eng. in Engineering Mechanics from Tsinghua University, China; and M.Eng. in Aerospace Engineering and Engineering Mechanics and Ph.D. in Computational Engineering and Sciences from Institute for Computational Engineering and Sciences (ICES), The University of Texas at Austin. After staying two years at ICES as a postdoctoral fellow, she joined CMU in 2007 as an assistant professor, and then was promoted to an associate professor in 2012 and a full professor in 2016. Her research interests include computational geometry, mesh generation, computer graphics, visualization, finite element method, isogeometric analysis and their application in computational biomedicine, material sciences and engineering. She has co-authored over 140 publications in peer-reviewed journals and conference proceedings, and received the Autodesk Best Paper Award 1st Place in SIAM Conference on Solid and Physical Modeling 2015, the Best Paper Award in CompIMAGE'16 conference and one of the 5 Most Highly Cited Papers Published in Computer-Aided Design during 2014-2016. She recently published a book entitled "Geometric Modeling and Mesh Generation from Scanned Images" with CRC Press, Taylor & Francis Group. She is the recipient of Presidential Early Career Award for Scientists and Engineers, NSF CAREER Award, Office of Naval Research Young Investigator Award, USACM Gallagher Young Investigator Award, Clarence H. Adamson Career Faculty Fellow in Mechanical Engineering, George Tallman Ladd Research Award, and Donald L. & Rhonda Struminger Faculty Fellow.

Homepage: https://www.andrew.cmu.edu/user/jessicaz/

Volumetric T-Spline Parameterization for Isogeometric Analysis with Engineering Applications

Abstract

As a new advancement of traditional finite element method, isogeometric analysis (IGA) was proposed to integrate design and analysis. In this talk, I will present our latest research on volumetric T-spline parameterization for IGA applications. For arbitrary-topology objects, we first build a polycube whose topology is equivalent to the input geometry and it serves as the parametric domain for the following trivariate T-spline construction. Boolean operations, geometry skeleton and centroidal Voronoi tessellation based surface segmentation are used to preserve surface features.A parametric mapping is then used to build a one-to-one correspondence between the input geometry and the polycube boundary. After that, we choose the deformed octree subdivision of the polycube as the initial T-mesh, and make it valid through pillowing, quality improvement, and applying templates or truncated subdivision schemes to handle extraordinary nodes.

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Yang Liu
Microsoft Research Asia, China

Brief Biography

Yang Liu is a Lead researcher in the Internet Graphics Group at Microsoft Research Asia. He received his Ph.D. degree in computer science from The University of Hong Kong in 2008, Master and Bachelor degrees in Computational Mathematics from University of Science and Technology of China, in 2003 and 2000 respectively. He worked in the Alice group at INRIA/LORIA as a Post-Doctoral researcher during 2008-2010. He joined Microsoft Research Asia in 2010. His research interests span in geometric modeling and optimization, mesh generation, computer-aided geometric design, architectural geometry and computational algebraic geometry. He has served as a program committee in many international conferences including Siggraph Asia 2014, SGP (2014-2016), PG (2013-2016), GMP (2014-2017), CAD/Graphics(2013-2017).

Homepage:
https://www.microsoft.com/en-us/research/people/yangliu/

What You Think is What You See

-- Smart Geometry Modeling and Processing

Abstract

How to best interpret user's design intention in modeling and processing is an important topic in computer graphics. In the talk, I will introduce three of our recent works that fulfill different levels of user intention: (1) Reconstruct aesthetic surfaces from curve networks that match the user's imagination; (2) Multiscale feature editing via the rolling guided normal filter; (3) Data-driven denoising by cascaded normal regression.

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Weighted and truncated T-spline basis functions are derived to enable analysis-suitability, including partition of unity and linear independence. Isogeometric analysis is performed using the developed basis functions with the study of convergence rate. The developed pipelines have been incorporated into commercial software such as Rhino and Abaqus.

The Location of Conference Venue

GMP2017 will be held in the Seaview Resort Hotel (Chinese: 海悦山庄酒店 ; Pinyin: Hai Yue Shan Zhuang Jiu Dian), which is located on Huandao South Road facing the South China Sea in the Siming district of Xiamen. Please see the map below:

How to Reach the Conference Venue

A. From Gaoqi International Airport (高崎国际机场)

- **By Taxi (Recommended)**

The Gaoqi International airport is about 20 km from the conference venue, located on the north side of Xiamen Island. The cost from the airport to the conference venue is approximately CNY 40 (05:00 - 23:00) and CNY 60 (23:00 - 05:00). The driving time is about 25 minutes, depending on traffic.

- **By Airport Express**

The conference venue can also be reached by Airport Express (airport shuttle bus in Xiamen), then by walk. At the airport, you have to follow the sign "机场快线" that will lead you to the shuttle bus station. Take Airport Express route No.13 (to Zengcuoan, Chinese: " 曾 厝 垵 "), then get off at bus stop named Tatou station (塔 头 站). The conference venue is 17 minutes' walk from the bus station. Below, see a detailed map with the route from the bus station to the conference venue:

Remark: Airport express runs every 25 minutes from 09:00-15:30, every 30 minutes from 16:00-19:00, and every 20 minutes from 19:15-the last flight.

B. From Xiamenbei Railway Station (厦门北站)

- **By Taxi (Recommended)**

Xiamenbei Railway Station is located in Houxi Town, Jimei District, Xiamen City, about 30 km from the conference venue. The cost from Xiamenbei Railway Station to the conference venue is approximately CNY 100 (05:00 - 23:00) and CNY 150 (23:00 - 05:00). The driving time is about 40 minutes, depending on traffic.

C From Xiamen Railway Station (厦门站)

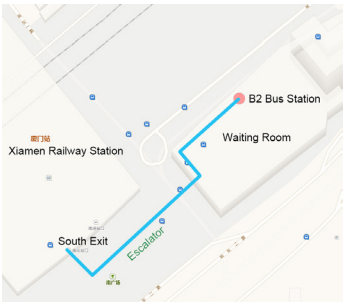
- **By Taxi (Recommended)**

Xiamen Railway Station is about 10 km from conference venue, which is located in the south-western part of Xiamen Island, near downtown Xiamen. The cost from Xiamen Railway Station to the conference venue is approximately CNY 30 (05:00 - 23:00) and CNY 50 (23:00 - 05:00). The driving time is about 20 minutes, depending on traffic.

- **By Bus**

Leave the station via the South Exit and ride the escalator upstairs to the South Square. Walk northeast and enter the building in front of you through NO.3 entrance, then walk along the zebra crossing to the parking point NO.1, see the map on the right. Take Bus route No.2 (i.e., No. B2) (CNY 5) and get off at Tatou Station (塔头站), the journey will be about 30 minutes, then walk to the conference venue. Please see the detailed map in A.

Remark: Bus route No. 2 (No. B2) service time is 08:00 - 21:00.



D From Litz Oceanview Hotel

Litz Oceanview Hotel is about 360 meters away (approximately 5 minutes walk) from the conference venue, please see the detailed map with the route from Litz Oceanview Hotel to the conference venue below:

Banquet Dinner

Schedule

We will serve the banquet dinner at **Honor Seafood Restaurant**, located next to the **Haiwan Park**, on Monday, April 17. The shuttle bus will departure from Seaview Resort Hotel (conference venue) to Honor Seafood Restaurant at 17:40. We recommend taking an after-dinner walk around the beautiful park.

A Brief Introduction of Haiwan Park

Built in 2006, Haiwan Park is the largest urban park in Xiamen. It is located in the midst of the west side of Binxi Road, the west sea area of Xiamen and the Yundang Lake, covering an area of 0.2 million square meters. In the park, visitors can get a good view of the sea to the west, the Yundang Lake to the east and the Bailuzhou Park, the Haicang Bridge to the northwest and the charming Gulangyu Island is also in the sight.

When it falls to night, this amazing park immediately turns into a place which has everything you need for a nice evening entertainment. Walking on the streets, visitors will be welcomed by the trees on both sides of the road and the colorful neon lights and pools. Visitors can sit on the sea side and also can go to the night bars with the live music just by the sea. Visitors can find there are American style bars providing delicious pizza and beers. With the music fluttering in the air, the live band is full of vitality in the evening.

Schedule

We arrange a visit to Zengcuoan (曾厝垵) on Tuesday evening, April 18. The shuttle bus to Zengcuoan will departure from Seaview Resort Hotel (conference venue) at 17:10, and return at 20:30.

A Brief Introduction of Zengcuoan

In the ancient village with a thousand-year history, each brick forms a painting, each old house implies a history, and each villager represents a fresh memory of Zengcuoan. Located at the side of Huandao Road, Zengcuoan covers an area of 1.25 square kilometers and surrounded by mountains and the sea with Xiamen University in the neighborhood. It is honored as "China's most artistic fishing village" by tourists from home and abroad.

Not too long ago, Zengcuoan was just a quiet fishing village. Today Zengcuoan is already a full-fledged destination, bustling with tourists. There are lots of places to stop for a cup of tea, a bowl of mango ice, a meal of steamed conch, baked oysters, roasted scallops and a variety of noodles with meatballs, seafood, savory mince and so forth. Also, many bars with a variety of styles are scattered here. If you become tired of the shopping and eating, cross the main road and take a stroll along the boardwalk on the beach.

THANK YOU FOR COMING!

GMP 2017 XIAMEN, CHINA