

Yiying Tong
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Ph.D. in Computer Science
Present position: Assistant Professor
Michigan State University

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CSE Dept., MSU
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EDUCATION

- ◇ 2000-2004: **Ph.D.** in Computer Science at the University of Southern California ([USC](#)).
Thesis title: “*Towards Applied Geometry in Graphics*”
Advisor: Professor Mathieu Desbrun.
- ◇ 1997-2000: **M.S.** in Computer Science at Zhejiang University, China ([ZJU](#)).
Thesis Title: “*Topics on Image-based Rendering*”
- ◇ 1993-1997: **B. Engineering** in Computer Science at Zhejiang University ([ZJU](#)).

ACADEMIC APPOINTMENTS

- ◇ 2008-present: **Assistant Professor**, Computer Science and Engineering Department, MSU.
- ◇ 2007-2008: **Research Associate**, Computer Science and Engineering Department, MSU.
- ◇ 2005-2007: **Postdoctoral Scholar**, Computer Science Department, Caltech.
- ◇ 2000-2004: **Research Assistant**, Graphics Immersion Lab, Computer Science Department, USC.
- ◇ 1996-2000: **Research Assistant**, Computer Integrated Manufacturing System Lab, Zhejiang Univ.
- ◇ Summer 1999: **Summer Intern**, Microsoft Research Asia, Beijing, China.

HONORS

- ◇ 2011: **IEEE TVCG Best Reviewer Award** (awarded to 3 out of the nearly 1000 TVCG reviewers of the year).
- ◇ 2010: **NSF CAREER Award**
- ◇ 2007: **Best Paper Award**,(Alliez, Cohen-Steiner, Tong, Desbrun) ACM/Eurographics Symposium on Geometry Processing.
- ◇ 2005: **Academic Achievement Award**, (GPA: 4.0), from the Office of International Services, University of Southern California.
- ◇ 2003: **Outstanding Research Assistant Award**, from the Computer Science Department, University of Southern California (two awards delivered each year).
- ◇ 1997: **Zhejiang University Mixed Class (Honor Class) Excellent Honor Certificate** (Awarded each year to the top 10 students in the mixed class program, which gathers the top 5% freshmen from various departments for the purpose of enhanced training in mathematics).

- ◇ 1993-1994: **Excellent Student**, from Zhejiang University.

RESEARCH INTERESTS

Foundations and applications of computational differential geometry for discrete modeling and simulation. In particular:

- ◇ **Applied Geometry**: computational models and tools for discretization of geometric representations, including a discrete exterior calculus, and its extensions and applications in modeling.
- ◇ **Animation and Simulation**: animation and simulation based on discretized geometric principles, including viscid & inviscid fluids, linear & non-linear elasticity and solid-fluid interface; interactive animation, inverse kinematics.
- ◇ **Applications to Practical Methods in Graphics and Related Areas**: application of computational geometry and topology concepts to provide robust geometric modeling tools, including parameterization, texture mapping, topological denoising; geometric detail modeling; mesh deformation; medical imaging; virus surface visualization; face recognition.

Publications

Refereed International Journals

- [1] Xin Feng and Yiying Tong. Choking loops on surfaces. *IEEE Transactions on Visualization and Computer Graphics*, 99(PrePrints):1, 2013.
- [2] Dongping Li, Xin Sun, Zhong Ren, Stephen Lin, Yiying Tong, Baining Guo, and Kun Zhou. Transcut: Interactive rendering of translucent cutouts. *IEEE Transactions on Visualization and Computer Graphics*, 19(3):484–494, 2013.
- [3] Xin Feng, Yuanzhen Wang, Yanlin Weng, and Yiying Tong. Compact combinatorial maps: A volume mesh data structure. *Graphical Models*, (online):1–18, 2012.
- [4] Xin Feng, Kelin Xia, Yiying Tong, and Guo-Wei Wei. Geometric modeling of subcellular structures, organelles, and multiprotein complexes. *International Journal for Numerical Methods in Biomedical Engineering*, 28(12):1198–1223, 2012.
- [5] Yuanzhen Wang, Beibei Liu, and Yiying Tong. Linear Surface Reconstruction from Discrete Fundamental Forms on Triangle Meshes. *Computer Graphics Forum*, 31(8):2277–2287, 2012.
- [6] Zherong Pan, Jin Huang, Yiying Tong, and Hujun Bao. Wake synthesis for shallow water equation. *Comput. Graph. Forum (Pacific Graphics)*, 31(7-1):2029–2036, 2012.
- [7] Yizhong Zhang, Huamin Wang, Shuai Wang, Yiying Tong, and Kun Zhou. A deformable surface model for real-time water drop animation. *IEEE Transactions on Visualization and Computer Graphics*, 18(8):1281–1289, 2012.
- [8] Jin Huang, Yiying Tong, Hongyu Wei, and Hujun Bao. Boundary aligned smooth 3d cross-frame field. *ACM Trans. on Graphics (SIGGRAPH Asia)*, 30(6):1–8, Dec 2011.

- [9] Dmitry Pavlov, Patrick Mullen, Yiyong Tong, Eva Kanso, Jerrold E. Marsden, and Mathieu Desbrun. Structure-preserving discretization of incompressible fluids. *Physica D: Nonlinear Phenomena*, 240(6):443–458, March 2011.
- [10] Jin Huang, Yiyong Tong, Kun Zhou, Hujun Bao, and Mathieu Desbrun. Interactive shape interpolation through controllable dynamic deformation. *IEEE Trans. on Visualization and Computer Graphics*, 17(7):983–992, July 2011.
- [11] Patrick Mullen, Alexander McKenzie, Dmitry Pavlov, Luke Durant, Yiyong Tong, Eva Kanso, Jerrold E. Marsden, and Mathieu Desbrun. Discrete Lie advection of differential forms. *Foundations of Computational Mathematics*, 11(2):131–149, 2011. 10.1007/s10208-010-9076-y.
- [12] Unsang Park, Yiyong Tong, and Anil K. Jain. Age invariant face recognition. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 32:947–954, 2010.
- [13] Kun Zhou, Weiwei Xu, Yiyong Tong, and Mathieu Desbrun. Deformation transfer to multi-component objects. *Computer Graphics Forum (Eurographics)*, 29:319–325, 2010.
- [14] Patrick Mullen, Keenan Crane, Dmitry Pavlov, Yiyong Tong, and Mathieu Desbrun. Energy-preserving integrators for fluid animation. *ACM Trans. on Graphics (SIGGRAPH)*, 28(3):1–8, 2009.
- [15] Patrick Mullen, Yiyong Tong, Pierre Alliez, and Mathieu Desbrun. Spectral conformal parameterization. *Computer Graphics Forum (Symposium of Geometry Processing)*, pages 1487–1494, July 2008.
- [16] Xiaohan Shi, Kun Zhou, Yiyong Tong, Mathieu Desbrun, Hujun Bao, and Baining Guo. Example-based dynamic skinning in real time. *ACM Trans. on Graphics (SIGGRAPH)*, 27:1–8, August 2008.
- [17] Sharif Elcott, Yiyong Tong, Eva Kanso, Peter Schröder, and Mathieu Desbrun. Stable, circulation-preserving, simplicial fluids. *ACM Trans. on Graphics*, 26(1):1–12, January 2007.
- [18] Eva Kanso, Marino Arroyo, Yiyong Tong, Arash Yavari, Jerrold E. Marsden, and Mathieu Desbrun. On the geometric character of stress in continuum mechanics. *Z. angew. Math. Phys.*, 58:1–14, 2007.
- [19] Patrick Mullen, Alexander McKenzie, Yiyong Tong, and Mathieu Desbrun. A variational approach to eulerian geometry processing. *ACM Trans. on Graphics (SIGGRAPH)*, pages 1–10, July 2007.
- [20] Xiaohan Shi, Kun Zhou, Yiyong Tong, Mathieu Desbrun, Hujun Bao, and Baining Guo. Mesh puppetry: Cascading optimization of mesh deformation with inverse kinematics. *ACM Trans. on Graphics (SIGGRAPH)*, pages 1–10, July 2007.
- [21] Ke Wang, Weiwei, Yiyong Tong, Mathieu Desbrun, and Peter Schröder. Edge subdivision schemes and the construction of smooth vector fields. *ACM Trans. on Graphics (SIGGRAPH)*, 25(3):1041–1048, July 2006.

- [22] Kun Zhou, Xin Huang, Xi Wang, Yiyong Tong, Mathieu Desbrun, Baining Guo, and Harry Shum. Mesh quilting for geometric texture synthesis. *ACM Trans. on Graphics (SIGGRAPH)*, 25(3):690–697, July 2006.
- [23] Haeyoung Lee, Yiyong Tong, and Mathieu Desbrun. Geodesics-based one-to-one parameterization of 3d triangle meshes. *IEEE Multimedia*, 12(1):27–33, January 2005.
- [24] Kun Zhou, Xi Wang, Yiyong Tong, Mathieu Desbrun, Baining Guo, and H.-Y. Shum. Texturemontage: Seamless texturing of surfaces from multiple images. *ACM Trans. on Graphics (SIGGRAPH)*, 24(3):1148–1155, July 2005.
- [25] Yiyong Tong, Santiago Lombeyda, Anil Hirani, and Mathieu Desbrun. Discrete multiscale vector field decomposition. *ACM Trans. on Graphics (SIGGRAPH)*, 22(3):445–452, June 2003.

Refereed International Conferences

- [26] Jeffrey R. Van Voorst, Yiyong Tong, and Leslie A. Kuhn. Artsurf: a method for deformable partial matching of protein small-molecule binding sites. In *ACM International Conference on Bioinformatics, Computational Biology and Biomedicine, BCB '12*, pages 36–43, 2012.
- [27] Xin Feng, Yuanzhen Wang, Yanlin Weng, and Yiyong Tong. Compact combinatorial maps in 3d. In *Computational Visual Media - First International Conference*, pages 194–201, 2012.
- [28] Yanlin Weng, Dongping Li, and Yiyong Tong. Constrained texture mapping on subdivision surfaces. In *Computational Visual Media - First International Conference*, pages 99–106, 2012.
- [29] Unsang Park, Yiyong Tong, and Anil K. Jain. Face recognition with temporal invariance: A 3d aging model. In *8th IEEE International Conference on Automatic Face and Gesture Recognition*, pages 1–7, 2008.
- [30] Ari Stern, Yiyong Tong, Mathieu Desbrun, and Jerrold E. Marsden. Variational integrators for maxwell’s equations with sources. In *Progress in Electromagnetics Research Symposium (PIERS)*, pages 711–715, 2008.
- [31] Pierre Alliez, David Cohen-Steiner, Yiyong Tong, and Mathieu Desbrun. Voronoi-based variational reconstruction of unoriented point sets. In *Symposium on Geometry Processing*, pages 39–48, July 2007.
- [32] Ilya Eckstein, Jean-Philippe Pons, Yiyong Tong, C.C. Jay Kuo, and Mathieu Desbrun. Generalized surface flows for mesh processing. In *Symposium on Geometry Processing*, pages 183–192, July 2007.
- [33] Kai Ye, Kun Zhou, Zhigeng Pan, Yiyong Tong, and Baining Guo. Low distortion shell map generation. In *IEEE Virtual Reality Conference*, pages 203–208, July 2007.
- [34] Liliya Kharevych, Weiwei, Yiyong Tong, Eva Kanso, Jerrold E. Marsden, Peter Schröder, and Mathieu Desbrun. Geometric, variational integrators for computer animation. In *ACM/EG Symposium on Computer Animation*, pages 43–51, July 2006.

- [35] Yiyong Tong, Pierre Alliez, David Cohen-Steiner, and Mathieu Desbrun. Designing quadrangulations with discrete harmonic forms. In *ACM/EG Symposium on Geometry Processing*, pages 201–210, July 2006.

Chapter in Book

- [36] Mathieu Desbrun, Eva Kanso, and Yiyong Tong. Discrete differential forms for computational modeling. In A. Bobenko, P. Schröder, J. Sullivan, and G Ziegler, editors, *Discrete Differential Geometry*. Springer, 2008.

Other Publications

- [37] Ilya Eckstein, Yiyong Tong, C.-C. Jay Kuo, and Mathieu Desbrun. Volume-controlled surface fairing. In *ACM SIGGRAPH 2007 Sketches*, August 2007.
- [38] Jiang Li, Yiyong Tong, Yong Wang, Heung-Yeung Shum, and Ya-Qin Zhang. Image-based walkthrough over the internet. In *International Workshop on Very Low Bitrate Video Coding*, October 2001.
- [39] Kun Zhou, Yiyong Tong, Zhigeng Pan, and Jiaoying Shi. Vecw: A virtual environment construction and walkthrough system. *Transaction of Computer Aided Design and Graphics (In Chinese)*, 2000.

SELECTED INVITED TALKS:

Minisymposium on Discrete Differential Geometry at Curves & Surfaces, 2010; Zhejiang University, 2011, 2010; IUPUI, 2010; University of Utah, 2008; Rutgers University, 2008; Purdue University, 2008; Michigan State University, 2007; UtopiaCompression Co., 2007; Rensselaer Polytechnic Institute, 2007; University of California, Riverside, 2007; Duke University, 2006; Caltech, 2006.

TEACHING EXPERIENCE

- ◇ Instructor, CSE 891 **Discrete Differential Geometry (Theory and Applications)** (Fall 2012)
- ◇ Instructor, CSE 260 **Discrete Structures** (Spring 2012)
- ◇ Instructor, CSE 472 **Computer Graphics** (Spring 2009, 2010, 2013)
Content: Introduction to Computer Graphics, basic OpenGL programming techniques, elementary geometric modeling, overview of rendering techniques, introduction to curves and surfaces.
- ◇ Instructor, CSE 872 **Advanced Computer Graphics** (Fall 2007, 2009, 2010, 2011)
Content: Overview on geometric modeling, rendering, and animation techniques; Selected current research topics ranging from mesh processing, to simulation (fluid, elastic objects), to non-photorealistic rendering.
- ◇ Instructor, CSE 803 **Computer Vision** (Fall 2010)

Content: Visual information processing; human and machine vision systems; image formation, transforms, encoding, enhancement; edge detection; segmentation; 2D and 3D object recognition.

◇ Co-instructor, CS 177 **Discrete Differential Geometry** (Fall 2006)

Responsibilities: Taught lectures on: discrete exterior calculus; Whitney forms; DeRham and Whitney complexes; Hodge decomposition; discrete geometry processing; invariant measures.

◇ Teaching Assistant, CSCI 520 **Computer Animation** (Spring 2003)

Responsibilities: Taught most of the graduate-level course under Dr. Mathieu Desbrun's supervision.

◇ Teaching Assistant, CSCI 480 **Computer Graphics** (Spring 2000)

Responsibilities: Assisted in grading written and programming homework, tutoring and grading final projects

◇ Teaching Assistant, CSCI 580 **3D Computer Graphics** (Fall 2000)

Responsibilities: Assisted in grading coding homework. Gave homework assignment lectures on how to develop a renderer.

SERVICES

◇ *Program Committee Member*: SIGGRAPH Asia '12 '11, ACM Solid and Physical Modeling Symposium '08, Shape Modeling International '13-'11 '09, Annual Conference on Computer Animation and Social Agents '12-'09, Symposium on Computer Animation '12 '11 '09, Symposium on Geometry Processing '12 '10, Pacific Graphics '12-'10.

◇ *International Conference Reviewer*: ACM-SIAM Symposium on Discrete Algorithms '12, EuroVis '10, ACM SIGGRAPH '12-'04, Symposium on Geometry Processing '09, '07, '05, Symposium on Computer Animation '06, EUROGRAPH '13-'06, Geometric Modeling and Processing '08, Pacific Graphics '09, '06.

◇ *International Journal Reviewer*: ACM Transactions on Graphics, Computer Aided Geometric Design, SIAM Journal on Applied Dynamical Systems, SIAM Journal on Scientific Computing, IEEE Transactions on Information, Forensics and Security, Computers & Graphics, International Journal of Image and Graphics, International Journal of Biomedical Imaging, IEEE Transactions on Visualization and Computer Graphics, Machine Vision and Applications, Journal of Computer Science and Technology, IEEE Signal Processing Letters, Computer Graphics Forum, Journal of Electronic Imaging, Journal of Foundations of Computational Mathematics, The Visual Computer.

◇ *Grant Proposals Reviewer/Panelist* NSF G&V Panels, Hong Kong Research Grants Council

◇ *Graduate Studies and Research Committee Member*, MSU CSE Department, 2008~present

◇ *Colloquium Committee Co-chair*, MSU CSE Department, 2010~present

◇ *Faculty Search Committee Member*, MSU CSE Department, 2011-2012

◇ *Graduate Admission Committee Member*, Caltech Computer Science Department, 2005

◇ *Undergraduate Research Mentor Connector Faculty* '11-'12, Michigan Louis Stokes Alliance for

Minority Participation Summer Undergrad Research Academy, '10, Professorial Assistantship, MSU, '13, '12, '10, '09, NSF ERC Integrated Media Systems Center, USC, '03, Summer Undergrad Research Fellowship, Caltech, '06

GRANTS

- ◇ An Adaptive and Robust Discrete Geometry Based Helmholtz Solver and Applications to Device Design, NSF, co-PI (25%). (CMMI 1250261, \$631K)
- ◇ CAREER: Theory and Practice of Space-Time Variational Integrators for Simulation and Animation, NSF, PI (100%). (IIS 0953096, \$521K)
- ◇ Differential Geometry Approach for Virus Surface Formation, Evolution and Visualization, NSF, as co-PI (33%). (CCF 0936830, \$498K)
- ◇ Collaborative Research: Geometrically-Derived Time Integrators and Motion Optimization for Computational Science, NSF, as PI at MSU (100%). (CMMI 0757123, \$80K)
- ◇ Collaborative Research: Eigengeometry: Geometric Spectral Computing for Computer Graphics and Computational Science, NSF, as lead PI (100%). (CCF 0811313, \$212K)

ADVISING ACTIVITIES

- ◇ **Completed Master's:** Weiwei Yang (co-advised at Caltech), Anand Viswanathan (MSU);
- ◇ **Completed PhD student:** Jeff VanVoorst (co-advisors: Leslie Kuhn, George Stockman);
- ◇ **Current PhD students:** Xin Feng, Beibei Liu, Xiaojun Wang, Yuanzhen Wang, Raul Pena;
- ◇ **Current Master student:** Rosemary Dutka, Amamah Abdorasool;
- ◇ **Undergrad students advised:** Aaron Ta, Ben Blaut (Professorial Assistant), Andre Jones (Diversity Program)

COLLABORATIONS

In active collaborations with:

- ◇ [Mathieu Desbrun](#) (Caltech),
- ◇ [Kun Zhou](#) (Zhejiang University),
- ◇ [Anil K. Jain](#) (MSU)
- ◇ [Guo-Wei Wei](#) (MSU)
- ◇ [Yang Wang](#) (MSU)
- ◇ [Pierre Alliez](#) (INRIA),
- ◇ [Eva Kanso](#) (USC),
- ◇ [David Cohen-Steiner](#) (INRIA)

◇ [Leslie Kuhn](#) (MSU)

etc.