BO ZHU

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EDUCATION

Ph.D. in Computer Science, Stanford University *Sep 2011-Jun 2015*
Thesis: Codimensional Fluid Simulation on Simplicial Complexes
ACM SIGGRAPH Outstanding Dissertation Award Top 5 Finalists, 2016
Advisor: Prof. Ronald Fedkiw
Dissertation Committee: Gianluca Iaccarino, Oussama Khatib, Silvio Savarese, and Philip Levis

M.S. in Computer Applied Technology, Shanghai Jiao Tong University *Sep 2008-Mar 2011*
Thesis: Physically-based Simulation of Highly Detailed Fluids

B.Eng. in Software Engineering, Shanghai Jiao Tong University *Sep 2004-Jun 2008*
Thesis: Simulation of Deformable Objects using Boundary Element Method

RESEARCH INTEREST

Computer Graphics, Computational Physics, Computational Fabrication, Scientific Computing, Computational Fluid Dynamics, Physically-based Animation, Topology Optimization, 3D Printing, Soft Robotics, Human Computer Interaction, Virtual Surgery, and Biomedical Simulation

RESEARCH EXPERIENCE

MIT, Computer Science and Artificial Intelligence Laboratory *Aug 2015-Present*
Postdoctoral Researcher: Developed computational systems to design, optimize, and fabricate novel mechanical and robotic systems such as microstructural soft bodies and customized asymmetric drones; utilize techniques from physical simulation, data generation, machine learning, and 3D printing to discover novel mechanics, topologies, and materials of complex physical systems.

Stanford University, Computer Graphics Laboratory *Sep 2011-June 2015*
Graduate Research Assistant: Built efficient computational infrastructures centered around novel geometric data structures to simulate a broad range of fluid phenomena exhibiting complex characteristics, including soap bubbles, impinging jets, paint, cheese, and mayonnaise.

Adobe, Advanced Technology Laboratory *Jun 2012-Sep 2012*
Research Intern: Designed GPU algorithms for fast simulation of chaotic coupled particle systems.

Japan Science and Technology Agency (JST), Design Interface Group *Aug 2010-Jan 2011*
Visiting Researcher: Developed sketch-based techniques to enable surgeons interactively draw and illustrate various types of heart defects, complex surgical procedures, and physiological systems.

Shanghai Jiao Tong University, Digital Art Laboratory *Jul 2009-Jul 2010*
Graduate Research Assistant: Designed efficient algorithms for generating highly-detailed animations of flow phenomena such as sand, smoke and turbulent flow.

Shanghai Jiao Tong University, *Jul 2007-Jun 2009*
Image Guided Surgery and Therapy Laboratory
Undergraduate Research Assistant: Developed soft body simulation and interaction algorithms to build virtual surgical training systems for endoscopical and minimally invasive surgeries.

TEACHING EXPERIENCE

Introduction to Computer Graphics (MIT 6.837) *Fall 2017*
Guest Lecturer: Teach the lecture of hierarchical representation.

Computational Fabrication (MIT 6.S079) *Spring 2016*
Guest Lecturer: Teach the lecture of numerical optimization algorithms.

Interactive Computer Graphics (Stanford CS248) *Spring 2013, Winter 2014*
Guest Lecturer and Teaching Assistant: Teach lectures of mobile game programming.

Introduction to Computer Graphics and Imaging (Stanford CS148) *Fall 2012, 2013, 2014*
Teaching Assistant: Designed course materials, assignments, and sample codes for ray tracing.

PUBLICATIONS

Peer-Reviewed Papers

Desai Chen, Melina Skouras, Bo Zhu, Wojciech Matusik. 2017. **Computational Discovery of Extremal Microstructure Families**. Science Advances (to appear).

Bo Zhu, Melina Skouras, Desai Chen, Wojciech Matusik. **Two-scale Topology Optimization with Microstructures**. ACM Transactions on Graphics, 36(5):164, 2017.

Adriana Schulz, Jie Xu, Bo Zhu, Changxi Zheng, Eitain Grinspun, Wojciech Matusik. **Interactive Design Space Exploration and Optimization for CAD Models.** ACM Transactions on Graphics (SIGGRAPH 2017), 36(4):157, 2017.

Tao Du, Adriana Schulz, Bo Zhu, Bernd Bickel, Wojciech Matusik. **Computational Multicopter Design**. ACM Transactions on Graphics (SIGGRAPH Asia 2016), 35(6):227, 2016.

Bo Zhu. **Codimensional Fluid Simulation on Simplicial Complexes.** Ph.D. Dissertation, Stanford University, Computer Science, 2015.

Bo Zhu, Minjae Lee, Ed Quigley, Ronald Fedkiw. **Codimensional Non-Newtonian Fluids**. ACM Transactions on Graphics (SIGGRAPH 2015), 34(4):115, 2015.

Wen Zheng, Bo Zhu, Byungmoon Kim, Ronald Fedkiw. **A New Incompressibility Discretization for a Hybrid Particle MAC Grid Representation with Surface Tension.** Journal of Computational Physics, 280:96-142, 2015.

Bo Zhu, Ed Quigley, Matthew Cong, Justin Solomon, Ronald Fedkiw. **Codimensional Surface Tension Flow on Simplicial Complexes.** ACM Transactions on Graphics (SIGGRAPH 2014), 33(4):111, 2014.

Bo Zhu, Wenlong Lu, Matthew Cong, Byungmoon Kim, and Ronald Fedkiw. **A New Grid Structure for Domain Extension**, ACM Transactions on Graphics (SIGGRAPH 2013), 32(4):63, 2013.

Bo Zhu, Lixu Gu. **A Hybrid Physically-based Deformable Model for Real-time Surgical Simulation**. Journal of Computerized Medical Imaging and Graphics, 36(5):356, 2012.

Bo Zhu, Michiaki Iwata, Ryo Haraguchi, Takashi Ashihara, Nobuyuki Umetani, Takeo Igarashi, Kazuo Nakazawa. **Sketch-based Dynamic Illustration of Fluid Systems**. ACM Transactions on Graphics (SIGGRAPH Asia 2011), 30(6):134, 2011.

Bo Zhu, Xubo Yang, Ye Fan. **Creating and Preserving Vortical Details in SPH Fluid.** Computer Graphics Forum (Pacific Graphics 2010), 29(7):2207-2214, 2010.

Bo Zhu and Xubo Yang. 2010. **Animating Sand as a Surface Flow**. Proc. of Eurographics 2010 (Short Paper), 9-12, 2010.

Bo Zhu, Lixu Gu, Zhe Zhou. **Particle-based Deformable Modeling with Pre-computed Surface Data in Real-time Surgical Simulation.** Proc. of 5th International Workshop on Medical Imaging and Augmented Reality (MIAR 2010, MICCAI Workshop), LNCS 6326, 503-512, 2010.

Bo Zhu, Lixu Gu, Xiaopeng Peng, Zhe Zhou. **A Point-based Simulation Framework for Minimally Invasive Surgery**. Proc. of 5th International Symposium on Biomedical Simulation (ISBMS 2010), LNCS 5958, 130-138, 2010.

Patents

Wojciech Matusik, Melina Skouras, Desai Chen, Bo Zhu**. Topology Optimization with Microstructures**. US Patent 15/418,528, filed in Jan 29, 2017.

PRESENTATIONS

Invited Talks

Complex Fluids and Soft Materials: A Numerical Perspective *Aug 2017*
Graphics and Mixed Environment Seminar (GAMES), China (Host: Prof. Kai Xu)

Developing Computational Techniques for Complex Physical Systems *Feb 2017*
EECS Department, Peking University (Host: Prof. Guojie Luo)

Codimensional Surface Tension Flow on Simplicial Complexes *May 2014*
Graphics Seminar, CSAIL, MIT (Host: Prof. Fredo Durand)

Codimensional Surface Tension Flow on Simplicial Complexes *May 2014*
Applied Math Seminar, Math Department, MIT (Host: Prof. John Bush)

Codimensional Surface Tension Flow on Simplicial Complexes *Apr 2014*
G-cafe seminar, Computer Graphics Lab, Stanford (Host: Manolis Savva)

Technical Paper Presentations

Two-Scale Topology Optimization using Microstructures *Aug 2017*
ACM SIGGRAPH 2017, Los Angeles

Codimensional Non-Newtonian Fluids *Aug 2015*
ACM SIGGRAPH 2015, Los Angeles

Codimensional Surface Tension Flow on Simplicial Complexes *Aug 2014*
ACM SIGGRAPH 2014, Vancouver

A New Grid Structure for Domain Extension *Jul 2013*
ACM SIGGRAPH 2013, Anaheim

Sketch-based Dynamic Illustration of Fluid Systems *Dec 2011*
ACM SIGGRAPH Asia 2011, Hong Kong

MEDIA

Designing the microstructure of printed objects. MIT News. *Aug 3, 2017*
Covered by science daily, myscience, sciencemag, space daily, technology.org, 3D print, 3d printing industry, neuro robotics magazine, robot globe, etc.

Reshaping computer-aided design. MIT News. *Jul 24, 2017*
Covered by science daily, engadget, 3D print, engineering.com, etc.

Design your own custom drone. MIT News. *Dec 5, 2016*
Covered by techcrunch, popular mechanics, engadget, robotics trends, IEEE spectrum, etc.

STUDENTS ADVISING

Julian G Fuchs (MIT UROP Student, 2017. Now B.S. at MIT EECS)
Jared Counts (MIT SuperUROP Student, 2016. Now M.S. at MIT Media Lab)
Megan Chao (MIT UROP Student, 2016. Now B.S. at MIT EECS)
William Chargin (Stanford AHPCRC Intern Student, 2014. Now B.S. at CMU Math)
Ulysses Sherman Bell (Stanford AHPCRC Intern Student, 2014. Now at AT&T)
Peter Huang (Stanford-China UGVR Student, 2014. Now Ph.D. at Stanford CS)
Justine Zhang (Stanford CURIS Student, 2013. Now Ph.D. at Cornell CS)
Kuan Fang (Stanford-China UGVR Student, 2013. Now Ph.D. at Stanford CS)
Jake Manning (Stanford AHPCRC Intern Student, 2013. Now at U.S. Army)
Garrett Shaw (Stanford AHPCRC Intern Student, 2013, Now at ExxonMobil)

PROFESSIONAL ACTIVITIES

Program Committee
SIGGRAPH/Eurographics Symposium on Computer Animation (SCA), 2016, 2017
Pacific Conference on Computer Graphics and Applications (Pacific Graphics), 2016, 2017

Session Chair
SIGGRAPH/Eurographics Symposium on Computer Animation (SCA), 2017, Fluids Session

Dissertation Committee
Ph.D. Dissertation Reading Committee, Computer Science, Stanford University, 2017
Ph.D. Oral Exam Committee, Computer Science Department, Stanford University, 2017
Dissertation: Two-way Coupling of Fluids to Reduced Deformable Bodies, Wenlong Lu

Conference Reviewer
ACM SIGGRAPH 2012-2017
ACM SIGGRAPH Asia 2012-2017
SIGGRAPH/Eurographics Symposium on Computer Animation 2016-2017
Eurographics 2015
Pacific Graphics 2015-2017

Journal Reviewer
ACM Transactions on Graphics (TOG)
IEEE Transactions on Visualization and Graphics (TVCG)
Computer Graphics Forum (CGF)
Journal of Visual Computers
Journal of Graphics Tools
Computers & Graphics
Computer Animation and Virtual Worlds

HONORS AND AWARDS

ACM SIGGRAPH Turing Award Celebration Grant (Student Scholar), ACM	*2017*
ACM SIGGRAPH Outstanding Dissertation Award Top 5 Finalists, ACM	*2015*
Max Planck Visual Computing Scholarship, MPI	*2014-2015*
Lawrence Tang Graduate Fellowship, School of Engineering, Stanford University	*2011-2012*
Google Excellence Scholarship, Google	*2010*
Outstanding Bachelor Thesis, Shanghai Jiao Tong University	*2008*
Morgan-Stanley Scholarship, Shanghai Jiao Tong University	*2008*

REFERENCES

Ron Fedkiw
(Ph.D. Advisor)
Professor
Computer Science Department, Stanford University
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Wojciech Matusik
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Takeo Igarashi
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