

# Chenfanfu (Fanfu) Jiang

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SIG Center for Computer Graphics  
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## Research Interests

Physics-based modeling and simulation for computer graphics, computer vision, scene understanding, robotics, and cognitive science.

## Academic Positions

Assistant Professor, Department of Computer and Information Science, University of Pennsylvania, June 2017 - Present

Postdoctoral Scholar, Departments of Mathematics and Computer Science, University of California, Los Angeles, 2015–2017.

## Education

Ph.D. Computer Science, University of California, Los Angeles, 2015.

Thesis title: The Material Point Method for the Physics-based Simulation of Solids and Fluids.

Thesis advisors: Demetri Terzopoulos (Computer Science) and Joseph Teran (Applied Math).

Thesis committee: Professor Stanley Osher and Professor Song-Chun Zhu.

Winner, UCLA HSSEAS Edward K. Rice Outstanding Doctoral Student Award.

M.S. Computer Science, University of California, Los Angeles, 2012.

Thesis title: Simulation of Elastic Solids with Efficient Self-Collision Handling.

B.S. Physics, University of Science and Technology of China, 2010.

The Class for the Gifted Young Program.

Thesis title: Relativistic Correction of  $(v/c)^2$  to the Collective Thomson Scattering for High-Temperature High-Density Plasma.

## Industry Experience

Consulting for Jixie Effects Inc., 2016–Present

Consulting for Awowd Inc., 2016–Present

Consulting for VoxelCloud Ltd., 2015–2017

Research and Development Intern, Walt Disney Animation Studios, Summer 2013

Research and Development Intern, Industrial Light and Magic, Lucasfilm, Summer 2012

## Awards and Honors

NSF CISE CRII Research Grant Award, 2018

Best Paper Award, Motion In Games (MIG), 2017

Sole Nomination from UCLA Computer Science Department, Chancellor's Award for Postdoctoral Research, 2017

Sole Nomination from UCLA, CGS/ProQuest Distinguished Dissertation Award in Mathematics, Physical Sciences, and Engineering, 2016

Edward K. Rice Outstanding Doctoral Student Award, Henry Samueli School of Engineering and Applied Science, University of California, Los Angeles, 2015

Best Paper Award, ACM SIGGRAPH/EG Symposium on Computer Animation (SCA), 2013

Honor Graduate Certificate, University of Science and Technology of China, 2010

Distinguished Undergraduate Student Researcher, Chinese Academy of Science, 2009

Excellent Student Scholarship, University of Science and Technology of China, 2006–2009

## Research Support

NSF CISE CRII Research Grant Award (IIS-1755544), 2018-2020

Penn Undergraduate Research Mentorship program (PURM) award, 2018

Gift from Awowd inc., 2017-2018.

NVIDIA GPU Grant, 2017.

## Postdocs

Andre Pradhana Tampubolon, Penn Computer and Information Science Postdoc, 2017.6 - present.

## Visiting Students

Yuanming Hu, MIT EECS visiting PhD student, 2017.7 - 2017.9.

Ziyin Qu, Penn Scientific Computing master student, 2017.6-present.

Hannah Bollar, Penn Digital Media Design undergraduate student, 2017.6-2017.12.

Yu Fang, Tsinghua University visiting undergraduate student, 2017.6-2017.1.

Ziheng Ge, University of Science and Technology of China visiting undergraduate student, 2017.6-2017.12.

Wenting Sun, Penn Digital Media Design undergraduate student, 2017.6-2017.9.

Duotun Wang, Beijing Institute of Technology undergraduate student, 2017.7-2017.9.

Jason Wang, Penn Digital Media Design undergraduate student, 2017.6-2017.9.

## PhD Committee

Tiantian Liu, Penn CIS, 2017-2018

Ming Gao, UW-Madison CS, 2017-2018

## Teaching

Lecturer, CIS 563: Physically Based Animation, UPenn, Spring 2018

Lecturer, CIS 700/004: Physics-Based Material Simulation, UPenn, Fall 2017

Teaching Assistant, Introduction to C++ Programming (PIC 10A), UCLA, Spring 2012

Teaching Assistant, Introduction to C++ Programming (PIC 10A), UCLA, Winter 2012

Assistant Lecturer, University of Science and Technology of China, 2009–2010

## Publications

### *Refereed Journal and Conference Papers*

Siyuan Qi, Yixin Zhu, Siyuan Huang, **Chenfanfu Jiang**, Song-Chun Zhu, Human-centric Indoor Scene Synthesis Using Stochastic Grammar, *IEEE Computer Vision and Pattern Recognition (CVPR)*, 2018.

Duotun Wang\*, James Kubricht\*, Yixin Zhu\* (Joint first authors), Wei Liang, Song-Chun Zhu, **Chenfanfu Jiang**, Hongjing Lu, Spatially Perturbed Collision Sounds Attenuate Perceived Causality in 3D Launching Events, *IEEE Conference on Virtual Reality and 3D User Interfaces (IEEE VR 2018)*

Ming Gao, Andre Pradhana, **Chenfanfu Jiang**, Eftychios Sifakis, An Adaptive Generalized Interpolation Material Point Method for Simulating Elastoplastic Materials, *ACM Trans. Graph.* 36, 6, Article 223, (SIGGRAPH Asia 2017)

Chuyuan Fu, Qi Guo, Theodore Gast, **Chenfanfu Jiang**, Joseph Teran, A Polynomial Particle-In-Cell Method, *ACM Trans. Graph.* 36, 6, Article 222, (SIGGRAPH Asia 2017)

Tomer Weiss, Alan Litteneker, **Chenfanfu Jiang**, Demetri Terzopoulos, Position-Based Multi-Agent Dynamics for Real-Time Crowd Simulation, *Motion in Games (MIG 2017)*. (Awarded MIG 2017 best paper).

**Chenfanfu Jiang\***, Yixin Zhu\* (Joint first authors), Siyuan Qi, Siyuan Huang, Jenny Lin, Xingwen Guo, Lap-Fai Yu, Demetri Terzopoulos, Song-Chun Zhu, Configurable, Photorealistic Image Rendering and Ground Truth Synthesis by Sampling Stochastic Grammars Representing Indoor Scenes, *ArXiv:1704.00112*, 2017.

**Chenfanfu Jiang**, Theodore Gast, Joseph Teran, Anisotropic Elastoplasticity for Cloth, Knit and Hair Frictional Contact, *ACM Transactions on Graphics (SIGGRAPH 2017)*, 36(4), pp. 152:1-152:14, 2017.

Andre Pradhana, Theodore Gast, Gergely Klar, Chuyuan Fu, Joseph Teran, **Chenfanfu Jiang**, Ken Museth, Multispecies Simulation of Porous Sand and Water Mixtures, *ACM Transactions on Graphics (SIGGRAPH 2017)*, 36(4), pp. 105:1-105:12, 2017.

**Chenfanfu Jiang**, Craig Schroeder, Joseph Teran, An Angular Momentum Conserving Affine Particle-in-Cell Method, *Journal of Computational Physics*, 338(1), pp. 137-164, 2017.

Kwitae Chong, **Chenfanfu Jiang**, Daniel Ram, Anand Santhanam, Demetri Terzopoulos, Peyman Benharash, Eric Dutton, Joseph Teran, Jeff Eldredge, Visualization of Vascular Injuries in Extremity Trauma, *Medical & Biological Engineering & Computing*, doi:10.1007/s11517-017-1619-9, 2017.

James Kubricht\*, Yixin Zhu\*, **Chenfanfu Jiang\*** (Joint first authors), Demetri Terzopoulos, Song-Chun Zhu, Hongjing Lu, Consistent Probabilistic Simulation Underlying Human Judgment in Substance Dynamics, *Proceedings of the 39th Annual Meeting of the Cognitive Science Society (Cogsci oral)*, 2017.

James Kubricht\*, **Chenfanfu Jiang\*** (Joint first authors), Yixin Zhu\*, Song-Chun Zhu, Demetri Terzopoulos, Hongjing Lu, Probabilistic Simulation Predicts Human Performance on Viscous Fluid-Pouring Problem, *Neural Information Processing Systems (NIPS) (Intuitive Physics Workshop)*, 2016.

Jenny Lin, Xingwen Guo, Jingyu Shao, **Chenfanfu Jiang**, Yixin Zhu, Song-Chun Zhu, A Virtual Reality Platform for Dynamic Human-Scene Interaction, *SIGGRAPH Asia (Virtual Reality Meets Physical Reality Workshop)*, 2016.

Xiaowei Ding, Xin Geng, **Chenfanfu Jiang**, Feng Tian, Xingjian Yan, Hang Qi, Lei Zhang, Yongchang Zheng, Fast Automated Liver Delineation from Computational Tomography Angiography, *Medical Image Understanding and Analysis Conference (MIUA)*, *Procedia Computer Science* 90: 87-92, 2016.

James Kubricht\*, **Chenfanfu Jiang\*** (Joint first authors), Yixin Zhu\*, Song-Chun Zhu, Demetri Terzopoulos, Hongjing Lu, Probabilistic Simulation Predicts Human Performance on Viscous Fluid-Pouring Problem, *Proceedings of the 38th Annual Meeting of the Cognitive Science Society (Cogsci oral)*, 2016.

Gergely Klar, Theodore Gast, Andre Pradhana, Chuyuan Fu, Craig Schroeder, **Chenfanfu Jiang**, Joseph Teran, Drucker-Prager Elastoplasticity for Sand Animation, *ACM Transactions on Graphics (SIGGRAPH 2016)*, 35(4), pp. 103:1-103:12, 2016.

Yixin Zhu\*, **Chenfanfu Jiang\*** (Joint first authors), Yibiao Zhao, Demetri Terzopoulos, Song-Chun Zhu, Inferring Forces and Learning Human Utilities From Videos, *IEEE Computer Vision and Pattern Recognition (CVPR oral)* 3823-3833, 2016.

Xiaowei Ding, Jianing Pang, Zhou Ren, Mariana Diaz-Zamudio, **Chenfanfu Jiang**, Zhaoyang Fan, Daniel Berman, Debiao Li, Demetri Terzopoulos, Piotr Slomka, Damini Dey, Automated Pericardial Fat Quantification From Coronary Magnetic Resonance Angiography: A Feasibility Study, *Journal of Medical Imaging*, 3(1), 014002, 2016.

Theodore Gast, Craig Schroeder, Alexey Stomakhin, **Chenfanfu Jiang**, Joseph Teran, Optimization Integrator for Large Time Steps, *IEEE Transactions on Visualization and Computer Graphics (TVCG 2015)*, 21(10) pp. 1103-1115, 2015.

Daniel Ram, Theodore Gast, **Chenfanfu Jiang**, Craig Schroeder, Alexey Stomakhin, Joseph Teran, Pirouz Kavehpour, A Material Point Method for Viscoelastic Fluids, Foams and Sponges, *ACM SIGGRAPH/ Eurographics Symposium on Computer Animation (SCA 2015)*, , pp. 157-163, 2015.

**Chenfanfu Jiang**, Craig Schroeder, Joseph Teran, Andrew Selle, Alexey Stomakhin, The Affine Particle-in-Cell Method, *ACM Transactions on Graphics (SIGGRAPH 2015)*, 34(4), pp. 51:1-51:10, 2015.

Alexey Stomakhin, Craig Schroeder, **Chenfanfu Jiang**, Larrence Chai, Joseph Teran, Andrew Selle, Augmented MPM for Phase-Change and Varied Materials, *ACM Transactions on Graphics (SIGGRAPH 2014)*, 33(4), pp. 138:1-138:11, 2014.

Yuting Wang, **Chenfanfu Jiang**, Craig Schroeder, Joseph Teran, An Adaptive Virtual Node Algorithm with Robust Mesh Cutting, *ACM SIGGRAPH/Eurographics Symposium on Computer Animation (SCA 2014)*, pp. 77-85, 2014.

Jan Hegemann, **Chenfanfu Jiang**, Craig Schroeder, Joseph Teran, A Level Set Method for Ductile Fracture, *ACM SIGGRAPH/Eurographics Symposium on Computer Animation (SCA 2013)*, pp. 193-201, 2013. (Awarded best paper)

Jingyi Fang, **Chenfanfu Jiang**, Demetri Terzopoulos, Modeling and Animating Myriapoda: A Real-time Kinematic/Dynamic Approach, *ACM SIGGRAPH/Eurographics Symposium on Computer Animation (SCA 2013)*, pp. 203-212, 2013.

**Chenfanfu Jiang**, Jian Zheng, Bin Zhao, Relativistic Correction of  $(v/c)^2$  to the Collective Thomson Scattering, *Chinese Phys. B* 20095202, 2011.

### *Abstracts and Posters*

Tomer Weiss, Alan Litteneker, **Chenfanfu Jiang**, Demetri Terzopoulos, Position-Based Multi-Agent Dynamics for Real-Time Crowd Simulation, *ACM SIGGRAPH/Eurographics Symposium on Computer Animation (SCA 2017 Posters)*, 2017

**Chenfanfu Jiang**, Craig Schroeder, Joseph Teran, A New Particle-In-Cell Technique for Reducing Noise, 14th U.S. National Congress on Computational Mechanics, 2017.

Yixin Zhu\*, **Chenfanfu Jiang\*** (Joint first authors), Yibiao Zhao, Demetri Terzopoulos, Song-Chun Zhu, Evaluating Physical Quantities and Learning Human Utilities from RGBD Videos, *SIGGRAPH Asia (Virtual Reality Meets Physical Reality Workshop)*, 2016.

**Chenfanfu Jiang**, Kwitae Chong, Jeff Eldredge, Daniel Ram, Craig Schroeder, Joseph Teran, Anand Santhanam, Demetri Terzopoulos, Peyman Benharash, Material Point Method Simulation of Ballistic Trauma, 12th World Congress on Computational Mechanics (WCCM), 2016.

Kwitae Chong, **Chenfanfu Jiang**, Anand Santhanam, Demetri Terzopoulos, Peyman Benharash, Joseph Teran, Jeff Eldredge, Numerical Simulation of Hemorrhage in Human Injury, 68th Annual Meeting of the APS Division of Fluid Dynamics, Gallery of Fluid Motion, Volume 60 Number 21, 2015.

Kwitae Chong, **Chenfanfu Jiang**, Peyman Benharash, Joseph Teran and Jeff Eldredge, Particle Simulation of Hemorrhage of Injured Human Body, 9th Southern California Symposium on Flow Physics, San Diego State University, 2015.

Jian Zheng, **Chenfanfu Jiang**, Bin Zhao, Relativistic Correction of  $(v/c)^2$  to the Collective Thomson Scattering, *Bulletin of the American Physical Society*, vol. 55, (APS 2010), 2010.

### *Course Notes and Technical Reports*

**Chenfanfu Jiang**, Craig Schroeder, Alexey Stomakhin, Andre Selle, Joseph Teran, The Material Point Method for Physics Based Simulation: Modeling and Discretization, *SIGGRAPH course notes*, 2016.

Theodore Gast, Chuyuan Fu, **Chenfanfu Jiang**, Joseph Teran, Implicit-shifted Symmetric QR Singular Value Decomposition of  $3 \times 3$  Matrices, UCLA Mathematics Department Technical Report (CAM16-19), 2016.

### Books

Joseph Teran, **Chenfanfu Jiang**, Continuum Mechanics for Computer Graphics, In preparation.

### Invited Talks

Elastoplasticity simulation in computer graphics, Rutgers University CS department colloquium, March 9th 2018

Scientific computing for animation, visual effects, virtual injury and surgery, Penn Presbyterian Medical Center, November 1st 2017

Elastoplasticity simulation in computer graphics, 2017 PICS Conference Emergent Phenomena: Patterns, Function and Beyond, October 5th 2017

Scientific computing for animation and visual effects, Cisco Research, September 20th 2017

Advances in Material Point Method for computer graphics, GAMES: Graphics And Mixed Environment Seminar, August 2017

Creating realistic simulations for animations and VFX, University of Pennsylvania Computer and Information Science Department Summer Session, July 6th 2017

Scientific computing: from computer graphics to virtual surgery, University of Pennsylvania Perelman School of Medicine, January 2016

Hybrid methods for computer graphics simulation of snow, sand, water, foam, lava and beyond, University of Pennsylvania Computer and Information Science Department, December 2016

Physics-based simulation of deformable solids and fluids, UCLA Human Perception Lab, October 2015.

### Media

(Media: UCLA) Best Paper Award at ACM SIGGRAPH Conference on Motion in Games 2017 <http://www.cs.ucla.edu/best-paper-award-at-acm-siggraph-conference-on-motion-in-games-2017/>

(Media: Gizmodo) We Finally Figured Out How To Make Realistic CG Mud <http://gizmodo.com/we-finally-figured-out-how-to-make-realistic-cg-mud-1795066887>

(Media: UCLA) UCLA Engineering honors top alumni, teachers, students at 2016 awards dinner <http://engineering.ucla.edu/ucla-engineering-honors-top-alumni-teachers-students-at-2016-awards-dinner/>

(Media: UCLA) UCLA mathematicians bring ocean to life for Disney's Moana <http://newsroom.ucla.edu/stories/ucla-mathematicians-help-bring-the-ocean-to-life-for-disneys-hit-movie-moana>

(Media: New Scientist) Blood gushes from virtual leg injury to help train combat medics <https://www.newscientist.com/article/dn28557-blood-gushes-from-virtual-leg-injury-to-help-train-combat-medics/>

(Media: Gizmodo) Simulation of a Leg Gushing Blood Is as Gross as You'd Expect <http://gizmodo.com/simulation-of-a-leg-gushing-blood-is-as-gross-as-you-d-e-1744946732>

(Media: Popular Science) Here is A Model Of Exactly How A Leg Bleeds Once It's Been Shot <http://www.popsci.com/heres-model-how-leg-bleeds-once-its-been-shot>

(Media - Chinese: Science Net) <http://news.sciencenet.cn/htmlnews/2015/11/332832.shtm>

## Professional Service

### *Panels*

NSF Panelist, 2018

### *Conference Organization*

Co-chair, 4th Workshop on Vision Meets Cognition: Functionality, Physics, Intentionality and Causality, CVPR 2018.

Organizer, The Tristate Workshop on Imaging and Graphics (TWIG) 2018.

Co-chair, 3rd Workshop on Vision Meets Cognition: Functionality, Physics, Intentionality and Causality, CVPR 2017.

Co-chair, 1st Workshop on Virtual Reality meets Physical Reality: Modelling and Simulating Virtual Humans and Environments, SIGGRAPH Asia 2016.

Co-chair, 2nd Workshop on Physical and Social Scene Understanding, CogSci 2016.

### *Committee*

Committee, ACM SIGGRAPH/Eurographics Symposium on Computer Animation (SCA) 2017.

### *Reviewing*

Reviewer, ACM SIGGRAPH 2018, 2017, 2016.

Reviewer, IEEE Transactions on Visualization and Computer Graphics (TVCG) 2018, 2017.

Reviewer, ACM Transaction on Graphics (TOG) 2018, 2017.

Reviewer, ACM SIGGRAPH Asia 2017.

Reviewer, SIGGRAPH Asia Workshop 2016.

Reviewer, Computer Graphics Forum 2017.

Reviewer, Eurographics 2018, 2017, 2014.

Reviewer, Pacific Graphics 2016.

Reviewer, Computer & Graphics 2017.

Reviewer, Computer Animation and Virtual Worlds 2017.

Reviewer, CAAI Transactions on Intelligent Technology, 2016.

Reviewer, AIMS Inverse Problems and Imaging 2016.

Reviewer, IEEE Transactions on Biomedical Engineering, 2016.