

Yixin Chen

PhD student at University of Toronto, Toronto, ON, Canada

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RESEARCH INTERESTS

My research interests mainly lie in physics-based simulation, high-performance fluid flow simulation and control, and computational design and fabrication.

EDUCATION

University of Toronto, Toronto, Canada

Sep. 2020 — Present

PhD in Computer Science

ShanghaiTech University, Shanghai, China

Sep. 2015 — Jul. 2019

BEng in Computer Science and Technology

PUBLICATIONS

Meta-ABC: A High-complexity Lattice Geometry Dataset for Deep Learning

Under revision

Yixin Chen, Towaki Takikawa, Ty Trusty, David I.W. Levin, Alec Jacobson, Elissa Ross, Daniel Hambleton

Multi-Agent Path Planning with Asymmetric Interactions In Tight Spaces

Accepted by CGF 2022 for publication

Vismay Modi, Yixin Chen, Abhishek Madan, Shinjiro Sueda, David I.W. Levin

GPU Optimizations for High-Quality Kinetic Fluid Simulation

Accepted by IEEE TVCG 2021 for publication

Yixin Chen, Wei Li, Rui Fan, Xiaopei Liu

Fast and Scalable Turbulent Flow Simulation with Two-Way Coupling

Accepted by ACM SIGGRAPH 2020 for publication

Wei Li, Yixin Chen, Mathieu Desbrun, Changxi Zheng, Xiaopei Liu

ACADEMIC EXPERIENCE

Dynamic Graphics Project, Department of Computer Science, University of Toronto

Research Assistant (RA) — Advisor: Professor David I.W. Levin

Sep. 2020 — Present

Physics-based Simulation

- Took comprehensive survey on current elastic body and fluid simulation research and analyzed the corresponding limitation of previous methods
- Implemented several basic physics-based methods and built up a c++ based simulation library
- Focusing on complex lattice geometry simulation
- Focusing on interactive and efficient fluid control problem

FLARE Lab, School of Information Science and Technology, ShanghaiTech University

Research Assistant (RA) — Advisor: Professor Xiaopei LIU

Feb. 2019 — Jan. 2020

Fast and Scalable Turbulent Flow Simulation with Two-Way Coupling

Collaboration with Professor Changxi Zheng from Columbia University, USA and Professor Mathieu Desbrun from California Institute of Technology, USA

- Proposed a stable and accurate solution for fluid-solid coupling by kinetic method with lattice Boltzmann equations
- Derived numerical optimization to determine high-order relaxation rates in non-orthogonal central-moment relaxation model and dimensional mapping for fluid-solid coupling
- Implemented new LBE solver with parallel optimization on both single and multi-GPU systems and achieved real-time coupling simulation with volume rendering

GPU Optimizations for Highly-Quality Kinetic Fluid Simulation

Collaboration with Professor Rui Fan from ShanghaiTech University, China

- Derived efficient parameterized data layout and memory access method for numerical fluid simulation based on the latest kinetic methods using lattice Boltzmann equations
- Proposed GPU optimization algorithms for single-scale and multi-scale fluid simulation using kinetic method to effectively balance efficiency and accuracy

- Implemented CUDA-based parallel optimization on single and multi-GPU, significantly faster than state-of-the-art GPUbased Navier-Stokes solvers for given accuracy and 10-20 times faster than a direct implementation

WORKING EXPERIENCE

Research Scientist and Engineer Intern

May. 2022 — Present

Adobe Inc. Seattle, WA, U.S. — Mentor: Timothy Langlois

Fluid Control with Laplacian Eigenfunctions

- Took a comprehensive survey on current fluid control research and analyzed the limitations of previous methods
- Worked on several baseline 2D fluid control mehod implementations
- Worked on interactive and efficient 2D fluid control problem based on eigenfluids pipeline
- Focusing on interactive and high-performance 2D and 3D fluid control problems

Research Scientist Intern

Jan. 2023 — Jun. 2023

Metafold 3D, Toronto, ON, Canada

- Develop microstructure simulation method and implement related code
- Incorporate the new simulation pipeline into the production environment

Teaching Assistant

Sep. 2021 — Apr. 2022

Department of Computer Science, University of Toronto, Toronto, ON, Canada

- Assisted course instructors in grading students' assignments
- Prepared and facilitated question and answer sessions to provide feedback on questions from students

Software Testing Intern

Aug. 2020 — Dec. 2020

UBTech Robotics, Chengdu, Sichuan, China

- Participate in algorithm training and test data collection, sorting, labeling and automation
- Worked with research team to test different functions and operations on current robot products and feedback with detailed reports

Research Scientist Intern

Jan. 2020 — Aug. 2020

Dgene Digital Technology (Shanghai) Co., Ltd., Shanghai, China

- Participated in Computer Graphics research projects, especially about high-performance high-quality fluid simulation
- Application of the optimized fluid simulation platform to intelligent city, intelligent medical treatment and other fields

SELECTED COURSES

School of Graduate Studies

GPA:3.96

- CSC2521H Topics in Computer Graphics (Seminar on Geometry and Animation)
- CSC2549H Physics-Based Animation
- CSC2233H Topics in Storage Systems
- CSC2558H Topics in Multidisciplinary HCI
- CSC2514H Human-Computer Interaction
- CSC2520H Geometry Processing
- CSC2505H Numerical Methods for Optimization Problems
- CSC2530H Computer Vision for Advanced Digital Photography

SKILLS

- **Programming Languages:** Python, C, C++, MATLAB, SQL, HTML
- **Computer Skills:** Git, LaTeX, Microsoft Office, Adobe Photoshop, Adobe After Effects, Adobe Illustrator
- **Engineering Platforms:** CUDA, OpenGL, OpenCV, CMake, Origin pro, Mathematica, NVVP
- **Languages:** Chinese (Native), English (Fluent: TOEFL (104, R 29, L 25, S 22, W 28))