Yizhou Chen

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EDUCATION

University of California, Los Angeles

Ph.D. in Mathematics   *2019.08-present*

- Area of Specialization: Physics-based simulation, computer graphics
- Advisor: Prof. Joseph Teran

University of California, Los Angeles

M.A. in Mathematics, B.A. in German   *2014.09-2018.06*

- Cumulative GPA: 3.96/4.0 (Summa Cum Laude)

KEY SKILLS

- High proficiency in C++ with 3 years of experiences. Proficiency in Matlab and Python with 2 years of experience. Proficiency in debugging tools such as GDB, LLDB and Visual Studio. Proficiency in Git, Preforce and Bazel.
- Deep understanding of physics-based simulation methods such as mesh based simulation techniques (e.g. FEM and mesh based MPM) and quasistatic simulations of deformable bodies, especially for muscle and skin deformations. Hands-on experiences with collision algorithms such as CCD and BVH.
- Maintain and contribute to simulation pipelines of large codebase, such as Unreal Engine and DRAKE.
- Parallel computing and threading optimization.
- Extensive experience with geometry processing algorithms such as volumetric mesh generation and self-intersection detection.
- Deep understanding of numerical linear algebra and high-performance implementations.
- Experience with building machine learning projects using pytorch.
- Ability for multitask management and the tenacity to lead projects.
- Languages: Chinese (native), English (advanced), German (C1).

WORK EXPERIENCE

UCLA Math Department   Los Angeles, U.S

Prof. Joseph Teran's lab   *2020.09-present*

- Developed a novel solver based on nonlinear Gauss Seidel method for quasistatic simulation for deformable bodies (e.g. muscles and cloth), which is 7x faster than the existing Newton's method.
- Maintained codebase on physics-based simulation using C++.
- Derived and optimized various constituitive models such as corotated and Hencky.
- Collaborated with other team members to develop a codebase for processing self-overlapping mesh based on local geometry.

Epic Games Inc.   Cary, U.S

Chaos Team   *2022.03-present*

- Developed a tetrahedral mesh simulation solver based on XPBD for real-time simulation of deformable bodies. It uses fixed corotaed model, which presents better robustness and visuals. The project is known as Chaos Flesh. It was showcased on GDC (Game Developers Conference) 2023.
- Developed a novel deformable body simulation solver that handles both real-time simulation and high end offline simulation such as high resolution muscle simulations.
- Implemented and debugged code inside Unreal Engine with a focus on game-play physics. Topics include: collision detection, procedural mesh generation and core simulation solver.
- Currently working on a novel cloth simulation system with real-time physics.

Toyota Research Institute   Boston, U.S

Dynamics and Simulation Team   *2021.06-2021.09*

- Derived a customised formulation of ADMM (Alternating Direction Method of Multipliers) solver for compliant contact simulation with a focus on robotics application.
- Implemented the solver into the codebase DRAKE. It achieved 2X-3X the convergence rate and better robustness than the existing solver, as presented with various examples.

RELEVANT COURSEWORK

Numerical Analysis
Scientific Computing
Continuum Mechanics
Data Mining

TEACHING EXPERIENCE

UCLA Math Department   Los Angeles, U.S
Teaching Assistant   *2019.09-present*
- Taught discussions in differential equations, linear algebra and analysis.

UCLA Math Department   Los Angeles, U.S
Undergraduate Reader   *2015.09-2018.06*
- Graded homework for upper division linear algebra classes and helped students to understand mathematical proof.

HONORS AND SCHOLARSHIP

Scholarship
- German Department Travel study program scholarship
- VIGRE Pure Mathematics REU Program stipend
- Math Department Merit Undergraduate Scholarship
- Daus Memorial Award

Honors
- Mathematics Departmental Honors
- Mathematics Department Scholars Program
- German Departmental Honors

PUBLICATIONS

- S. Gagniere, Y. Han, **Y. Chen**, D. Hyde, A. Marquez-Razon, J. Teran, R. Fedkiw, *A Robust Grid-Based Meshing Algorithm for Embedding Self-Intersecting Surfaces*, Computer Graphics Forum, 2023.
- A. Razon, **Y. Chen**, Y. Han, S. Gagniere, M. Tupek, J. Teran, *A Linear and Angular Momentum Conserving Hybrid Particle/Grid Iteration for Volumetric Elastic Contact*, ACM SIGGRAPH/Eurographics Symposium on Computer Animation (SCA), 2023
- **Y. Chen**, Y. Han, J. Chen, S. Ma, R. Fedkiw, J. Teran, *Primal Extended Position Based Dynamics for Hyperelasticity*, The 15th Annual ACM SIGGRAPH Conference on Motion, Interaction and Games (MIG), 2023. **(Best Student Paper Award)**
- **Y. Chen**, Y. Han, J. Chen, J. Teran, *Position-Based Nonlinear Gauss-Seidel for Quasistatic Hyperelasticity*, arXiv preprint arXiv:2306.09021, 2023.