Peter Yichen Ch	ien
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RESEARCH VISION	The overarching objective of my cross-disciplinary research is to democratize physics simulation by improving its precision, speed, ease of use, and generalizability. This is achieved through a thoughtful fusion of cutting-edge AI methodologies and classical numerical methods. My research empowers 3D content creation for artists, enhances design/fabrication/control for engineers, and aids material discovery for scientists, all through next-generation physics simulations that in- corporate AI while retaining the essential foundation of partial differential equations (PDEs).
Academic Positions	Massachusetts Institute of Technology (MIT)2022 - PresentPostdoc in Computer Science and Artificial Intelligence Lab (CSAIL)Advisor: Wojciech Matusik
Education	Columbia University2016 - 2022Ph.D., Computer ScienceDissertation: Multiscaling and Machine Learning Approaches to Physics SimulationAdvisor: Eitan GrinspunCommittee: Ken Kamrin, Changxi Zheng, Steve Waiching Sun, Hod Lipson
	University of California, Los Angeles (UCLA)2012 - 2016B.S., Applied Mathematics, Summa Cum LaudeAdvisor: Joseph TeranSherwood Prize in Mathematics for Outstanding Undergraduate Achievement
Industry Research	Meta Reality Labs (AR/VR)2020 - PresentMentors and sponsors: Kevin Carlberg, Maurizio Chiaramonte
PUBLICATIONS	 *Co-first authors, + Corresponding authors [1] Zeshun Zong, Xuan Li, Minchen Li, Wojciech Matusik, Eitan Grinspun, Maurizio Chiaramonte, Kevin Carlberg, Chenfanfu Jiang, and Peter Yichen Chen. Neural stress fields for reduced-order elastoplasticity and fracture. SIGGRAPH ASIA 2023
	[2] Chang Yue, Peter Yichen Chen ⁺ , Maurizio Chiaramonte, Kevin Carlberg, and Eitan Grinspun ⁺ . LiCROM: Linear-subspace continuous reduced order modeling with neural fields. SIGGRAPH ASIA 2023
	[3] Pingchuan Ma ⁺ , Peter Yichen Chen ⁺ , Bolei Deng, Joshua B. Tenenbaum, Tao Du, Chuang Gan, and Wojciech Matusik. Learning neural constitutive laws from motion observations for generalizable PDE dynamics. In <i>International Conference on Machine Learning (ICML)</i> , 2023
	[4] Yichen Li, Peter Yichen Chen, Tao Du, and Wojciech Matusik. Learning preconditioner for conjugate gradient PDE solvers. In <i>International Conference on Machine Learning (ICML)</i> , 2023b
	[5] Honglin Chen [*] , Rundi Wu [*] , Eitan Grinspun, Changxi Zheng, and Peter Yichen Chen. Implicit neural spatial representations for time-dependent PDEs. In <i>International Conference on Machine Learning (ICML)</i> , 2023
	[6] Peter Yichen Chen, Jinxu Xiang, Dong Heon Cho, Yue Chang, G A Pershing, Henrique Teles Maia, Maurizio M Chiaramonte, Kevin Thomas Carlberg, and Eitan Grinspun. CROM: Con- tinuous reduced-order modeling of PDEs using implicit neural representations. In International Conference on Learning Representations (ICLR), 2023 [notable-top-25%] [Best Paper Award @ Neural Fields Workshop]
	[7] Peter Yichen Chen, Maurizio Chiaramonte, Eitan Grinspun, and Kevin Carlberg. Model reduc- tion for the material point method via an implicit neural representation of the deformation map. <i>Journal of Computational Physics (JCP), 2023</i>

	[8] Xuan Li, Yi-Ling Qiao, Peter Yichen Chen, Krishna Murthy Jatavallabhula, Jiang, and Chuang Gan. PAC-NeRF: Physics augmented continuum neu geometry-agnostic system identification. In International Conference on L tions (ICLR), 2023a [notable-top-25%]	, Ming Lin, Chenfanfu ral radiance fields for <i>Learning Representa</i> -
	[9] Peter Yichen Chen, Maytee Chantharayukhonthorn, Yonghao Yue, Eitar Kamrin. Hybrid discrete-continuum modeling of shear localization in granu the Mechanics and Physics of Solids (JMPS), 2021	n Grinspun, and Ken Ilar media. <i>Journal of</i>
	[10] Yonghao Yue [*] , Breannan Smith [*] , Peter Yichen Chen [*] , Maytee Chantha Kamrin, and Eitan Grinspun. Hybrid grains: adaptive coupling of discrete ulations of granular media. <i>ACM Transactions on Graphics (TOG), Pres</i> <i>ASIA 2018</i>	arayukhonthorn [*] , Ken and continuum sim- cented at SIGGRAPH
	[11] Peter Yichen Chen, Jonathan David Blutinger, Yorán Meijers, Changxi Zh and Hod Lipson. Visual modeling of laser-induced dough browning. <i>Journa</i> 2019	eng, Eitan Grinspun, al of food engineering,
	[12] Jonathan David Blutinger, Yorán Meijers, Peter Yichen Chen, Changxi Zh and Hod Lipson. Characterization of co2 laser browning of dough. <i>Innova</i> <i>Emerging Technologies</i> , 2019	eng, Eitan Grinspun, ative Food Science &
	[13] Jonathan David Blutinger, Yorán Meijers, Peter Yichen Chen, Changxi Zh and Hod Lipson. Characterization of dough baked via blue laser. <i>Journa</i> 2018	eng, Eitan Grinspun, I of food engineering,
Preprints	[14] Liane Makatura, Michael Foshey, Bohan Wang, Felix HähnLein, Pingch Megan Tjandrasuwita, Andrew Spielberg, Crystal Elaine Owens, Peter Zhao, Amy Zhu, Wil J Norton, Edward Gu, Joshua Jacob, Yifei Li, Adria ciech Matusik. How can large language models help humans in design arXiv, 2023	uan Ma, Bolei Deng, Yichen Chen, Allan ana Schulz, and Woj- and manufacturing?
Awards and Fellowships	 Best Paper Award, Neural Fields Workshop at ICLR, 2023 MMLDT-CSET Conference Fellowship, National Science Foundation, 2021 Best Poster Award, New England Workshop on the Mechanics of Mate 2017 	erials and Structures,
Undergraduate Honors	Sherwood Prize in Mathematics for Outstanding Undergraduate Achievement College and Departmental Honors, UCLA, 2016 Jeffrey George Wilson Research Award, UCLA, 2015 Irving and Jean Stone Research Award, UCLA, 2015 Meritorious Winner in Mathematical Contest in Modeling (MCM), COMAP, 207 Caltech SURF Fellowship, California Institute of Technology, 2014 The Rose Gilbert in Memory of Maggie Gilbert Scholarship, UCLA, 2014 Honorable Mention in Mathematical Contest in Modeling (MCM), COMAP, 207	, UCLA, 2016 15 14
INVITED TALKS	Al-enhanced Physics Simulation Boston University Georgia Tech Accurate and Fast PDE Solvers via Neural Fields Caltech Peking University	October 2023 October 2023 August 2023 May 2023
	Tsinghua University University of Stuttgart and NEC Labs Extrality	April 2023 March 2023 January 2023
	Towards a Physical Metaverse ETH Zurich MIT	February 2022 February 2022

	UCLA NVIDIA AI	February 2022 January 2022
	Multiscaling and Machine Learning Approaches to Physics Simulation NVIDIA Omniverse Hybrid Grains: Adaptive Coupling of Discrete and Continuum Simulations of	November 2021 Granular Media
	DreamWorks Animation	June 2019
Selected Presentations	Model Reduction for the Material Point Method on Nonlinear Manifolds Using MMLDT-CSET Conference	g Deep Learning September 2021
	AAAI Symposium on Combining AI and ML with Physics Sciences Simulating Shear Localization Using a Hybrid Discrete-Continuum Approach	March 2021
	Engineering Mechanics Institute (EMI) Conference New England Workshop on Mechanics (NEW.Mech)	June 2019 October 2019
	Simulating Funnel Discharge of Granular Materials Using a Hybrid MPM-DE New England Workshop on Mechanics (NEW.Mech) [Best Poster Award	M Approach I] October 2017
More Industry	Tencent Games	Summer 2021
RESEARCH	Weta Digital	Summer 2018
	Multi-scale tissue simulation for James Cameron's Avatar (uncredited)	
Teaching Experiences	MIT 6.837 Computer Graphics - Particle Simulations Substitute lecturer	Fall 2023
	Topics: Numerical ODEs, Time Integration, Lennard-Jones Forces, and Coll. Columbia University COMS 4167 Physics-based Computer Animation	<i>ision</i> Fall 2017
	Teaching assistant Topics: Time Integration, Collision Detection, Rigid Bodies, Elasticity, Incomp Finite Element Method, Finite Difference Method, Computational Fluid Dyna	ressible Viscous Fluid, mics. Control
	Columbia University COMS W4160 Computer Graphics	Spring 2018
	Topics: OpenGL, Graphics Pipeline, Shaders, Texture Mapping, Ray Traction, Monte Carlo Integration, Triangle Meshes, Mesh Manipulation, Charward/Backward Kinematics, Spline Curves	ring, Rendering Equa- racter Animation, For-
	New Jersey Institute of Technology IT 360 Computer Graphics Guest lecturer	Spring 2020, Fall 2021
Selected Courseworks	Mechanics: Continuum Mechanics, Fluid Mechanics, Theory of Elasticity, Co Finite Element Method (FEM), Multiscale Modeling	omputational Plasticity,
	Mathematics: Numerical Analysis for ODEs and PDEs, Computational Li Optimization, Scientific Computing	near Algebra, Convex
	Computer Science: Programming (C/C++, CUDA), Operating System, Analy	sis of Algorithms
Advising	Federal University of Paraíba	2022 Dresent
	Instituto de Matemática Pura e Aplicada	2023 - Present
	Daniel Perazzo, master student MIT	2023 - Present
	John Eastman, undergrad student \rightarrow master student at MIT Marcel Roed, master student \rightarrow PhD student at Stanford	2022 - 2023 2022 - 2023
	Jinxu Xiang, master student \rightarrow Graphics Researcher at Tencent Pixel Lab	2021 - 2023
	Dong Heon Cho, master student \rightarrow PhD student at Duke	2021 - 2023 Spring 2022
	Mingxuan Li, master student \rightarrow Intern at Treyarch	Spring 2022 Spring 2022
	Logan Wang, master student $ ightarrow$ Intern at Meta Reality Labs	Fall 2021

SERVICES	Organizers for The AI4PDE meetup at ICLR 2023 Mentors for The Summer Geometry Initiative 2023
	The RCDC@SIGGRAPH Undergraduate Mentorship Program 2021
REVIEWING FOR CONFERENCES AND JOURNALS	International Conference on Learning Representations (ICLR) Neural Information Processing Systems (NeurIPS) ACM Computing Surveys ACM SIGGRAPH North America ACM SIGGRAPH Asia ACM Transactions on Graphics (TOG) Eurographics Pacific Graphics Journal of Food Engineering
References	Eitan Grinspun Department of Computer Science Department of Mathematics University of Toronto send.Grinspun.F52E65C605@interfoliodossier.com eitan@cs.toronto.edu
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	Steve Waiching Sun Department of Civil Engineering and Engineering Mechanics Columbia University send.Sun.08B9AA3177@interfoliodossier.com wsun@columbia.edu
	Wojciech Matusik Department of Electrical Engineering and Computer Science Department of Mechanical Engineering

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