Kevin Zeng

U.S. Citizen Phone: 1-701-610-1677 Email: kzeng3@wisc.edu
Mailing Address: 424 W Mifflin Street, Apt 204, Madison WI, 53703

OBJECTIVE

Seeking career oriented **internship** opportunity with experience in deep reinforcement learning, deep modeling, dynamical systems theory, and control theory

EDUCATION

University of Wisconsin-Madison **Sept 2017-Dec 2022 (Expected)**
Department of Chemical and Biological Engineering Madison, WI

- PhD in Chemical Engineering (Advisor: Prof. Michael D. Graham)
- Thesis: *Deep Reinforcement Learning Control Strategies for Spatiotemporal Chaotic Systems and Flows*
- Related Coursework: *Comp. Methods I&II, Dynamical Systems and Modeling, Nonlinear Systems Modeling & Control, Adv. Linear Algebra, Intermediate Transport Phenomena*
- GPA: 4.00/4.00

University of Minnesota-Twin Cities **Sept. 2013-May 2017**
Department of Chemical Engineering and Materials Science Minneapolis, MN

- Bachelor of Chemical Engineering, Minor in Chemistry
- GPA: 3.85/4.00

SKILLS

- Languages (3+ yrs): *Python, TensorFlow, Keras, SciKit-Learn, MATLAB, Matplotlib, (1 yr) C++ , PyTorch, SQL*
- Strong knowledge in deep systems modeling, deep reinforcement learning, dynamical systems and control theory
- Practical problem solving, quick to pick-up domain knowledge, navigating ill-defined problems

EXPERIENCE

Research Assistant **Aug. 2018-Present**
University of Wisconsin-Madison, Professor Michael D. Graham (55 hrs/week)

- Developed a symmetry-reduced deep reinforcement learning method for flow systems possessing symmetries, yielding enhanced data efficiency and improved learning performance
- Applied Neural Ordinary Differential Equations (ODEs) and deep autoencoders to learn reduced-order predictive models of chaotic dynamical systems under the influence of control actuations
- Developed an end-to-end data-driven model-based reinforcement learning method to efficiently extract control strategies from a limited data set generated from off-policy interactions

Research Assistant **Oct. 2017-July 2018**
University of Wisconsin-Madison, Professor Nicholas L. Abbott (60 hrs/week)

- Fabricated molecular self-assembled polymer materials using liquid crystal defects and grooved polymer coatings
- Characterized the polymer materials, coatings, and dynamics via polarized light and fluorescent microscopy

Research Assistant **April 2016-May 2017**
University of Minnesota-Twin Cities, Professor Samira Azarin (14 hrs/week)

- Examined the in vivo capture of metastatic cells via porous polymer scaffolds and the efficacy of focal hyperthermia therapy using histology and TUNEL staining techniques
- Developed a method of polymer dip-coating aluminum disks for improved biocompatibility and robustness
- Optimized drug-loaded polymer disk fabrication and post-processing methods

Research Assistant **May-Sept., Dec-Jan. 2012-2015**
University of North Dakota, Professor Julia Zhao (40 hrs/week)

- Researched the synthesis of gold nano structure morphologies (rods, stars, wires) and the fluorescence quenching ability of graphene oxide via a rigid silica spacer shell
- Investigated gold-graphene oxide and gold-silica particles as near-infrared hyperthermia agents for cancer therapy

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LEADERSHIP AND DIVERSITY

- *Chemical Engineer Graduate Student Association Media Chair:* Cofounded the Graduate Newsletter discussing student climate issues, student-faculty relations, graduate student events, and student health resources
- *Engineering Expo*: Initiated and coordinated 3 outreach booths exhibiting graduate research in liquid crystal sensors, fluid flow visualization, and capsule rockets to spark STEM interest in K-12 students and families in Wisconsin; designed and constructed interactive fluid flow demos and trained booth volunteers
- *Academic Climate Committee member*: Engaged in student climate dialogue and disseminated discussions via the graduate student newsletter

TEACHING EXPERIENCE 2019, 2020

Chemical Engineering Materials (CBE440), Transport Phenomena Lab (CBE324) Madison, WI

- Designed, organized, and led heat and momentum transport, material properties undergraduate lab courses
- Delivered class lectures, led student discussions, and troubleshot lab equipment

HONORS, AWARDS, & SERVICES

Multicultural Center for Academic Excellence All-Star Gold Award—University of Minnesota	Spring 2016
Dean's List of the College of Science and Engineering—University of Minnesota	2013-2017
Tau Beta Pi Membership	2015-Present
Presidential Scholarship—University of Minnesota	2013-2017
National Science Foundation Graduate Research Fellowship Program—Honorable Mention	2018
Engineering Expo: Visualizing Fluids—University of Wisconsin	2018-2019
Chemical Engineer Graduate Student Association Media Chair—University of Wisconsin	2019-Present

PUBLICATIONS

(1) **Zeng, K.** and Graham, M.D.*, *Symmetry Reduction for Deep Reinforcement Learning Active Control of Chaotic Spatiotemporal Dynamics*, Phys. Rev. E 104, 014210 (2021)
(2) **Zeng, K.**, Linot, A.J., and Graham, M.D.*, *Deep Reinforcement Learning Using Data-Driven Reduced-Order Models Discovers and Stabilizes Low Dissipation State Control Strategy*, [in-preparation]
(3) Wu, X., Xing, Y., **Zeng, K.**, Huber, K., Zhao, J.X.*, *Study of Fluorescence Quenching Ability of Graphene Oxide with a Layer of Rigid and Tunable Silica Spacer*, Langmuir. 34, 2, 603-611 (2018)
(4) Pelaez, F.*, Manuchehrabadi, N.*, Roy, P., Natesan, H., Wang, Y., Racila, E., Silbaugh, A., Fong, H., **Zeng, K.,** Bischof, J.C., and Azarin, S.M., *Biomaterial scaffolds for non-invasive focal hyperthermia as a potential tool to ablate metastatic cancer cells*, Biomaterials. 166:27-37 (2018)

CONFERENCES AND INVITED TALKS

(1) **Zeng, K.**, Linot, A.J., Graham, M.D., *Deep Reinforcement Learning Using Data-Driven Reduced-Order Models Discovers and Stabilizes Low Dissipation Equilibria*, American Physical Society Division of Fluid Dynamics Annual Meeting, Nov. 2021.
(2) **Zeng, K.** and Graham, M.D., *Symmetry Reduction for Deep Reinforcement Learning Active Flow Control*, AIChE Annual Meeting, Nov. 2021.
(3) **Zeng, K.**, Linot, A.J., Graham, M.D., *Deep Reinforcement Learning Using Data-Driven Reduced-Order Models Discovers and Stabilizes Low Dissipation Equilibria*, Nonlinear Science Webinar, Georgia Tech., Oct. 2021.
(4) **Zeng, K.** and Graham, M.D., *Symmetry Reduction for Deep Reinforcement Learning Active Flow Control*, American Physical Society Division of Fluid Dynamics Annual Meeting, Nov. 2020.