

Christopher J. Miles

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URL: <http://www.chrisjohnmiles.com/>

Github: <https://github.com/cjm715>

EDUCATION

Massachusetts Institute of Technology

B.S. in Physics, minor in Mechanical Engineering

Cambridge, MA

Sept. 2006 – June. 2010

University of Michigan

M.S. in Applied Mathematics

Ph.D. in Physics

Ann Arbor, MI

Sept. 2012 – Dec 2014

Sept. 2012 – April 2018

Advisor: Prof. Charles R. Doering

Highlighted graduate coursework: Machine Learning, Numerical Differential Equations, Stochastic Processes

Santa Fe Institute: Complex Systems Summer School

Certificate of completion

Santa Fe, NM

June 2017

Udacity: Deep Reinforcement Learning Nanodegree

July 2018 — Present

Coursera: Deep Learning Specialization

July 2018 — Present

EXPERIENCE

University of Michigan: Optimal control of fluid mixing (PhD Thesis)

Ann Arbor, MI

Graduate Student Research Assistant

Spring 2013 – April 2018

- Discovered special cases where diffusion can limit the mixing effectiveness of incompressible flows.
- Numerically solved Euler-Lagrange equations for a series of optimization problems on fluid mixing using gradient-based optimization methods.
- See article: **C. J. Miles**, C. R. Doering, Diffusion-limited mixing by incompressible flows, Nonlinearity, 31, 5, 2018

W.H. Oceanographic Inst.: Collective motion of active matter

Woods Hole, MA

Research Fellow

Summer 2016

- Discovered hydrodynamic instabilities due to the collective motion of an active particle systems that models a collection of swimming bacteria.
- Developed a custom partial-differential-equation solver to find the solution to the Smoluchowski equation by using a two-step Adams-Bashforth method and a pseudo-spectral Fourier method.
- Click the submitted pre-print article here to read more: **C. J. Miles**, A. A. Evans, M. J. Shelley, and S. E. Spagnolie, Active matter invasion of a viscous fluid and a no-flow theorem [arXiv:1803.05543\[cond-mat.soft\]](https://arxiv.org/abs/1803.05543)

Personal project: Multi-agent reinforcement learning of self-driving car traffic

Researcher

Sept. 2017

- Implemented Q-learning in a multi-agent gridworld system mimicking self-driving car traffic where many agents are attempting to move across a board while avoiding collision. See white paper: http://www.chrisjohnmiles.com/personal_projects/sficc

Personal project: Repository of multi-agent OpenAI gym environments

Contributor

July 2018 – Present

- Created an open source python package with multi-agent reinforcement learning environments. The package includes classic 2-player matrix games and multi-player Snake environment. See: <https://github.com/cjm715/mgym>

TECHNICAL SKILLS

Proficient: Python, Git, Github, and Jupyter notebook.

Familiar with: Matlab, Javascript, PyTorch, and Linux.