Christopher J. Miles

http://www.chrisjohnmiles.com/
Data Scientist, Physicist, and Mathematician

Email : chris.john.miles@gmail.com
Location: San Francisco, CA

EDUCATION

- **Massachusetts Institute of Technology** — Cambridge, MA
  Batchelor of Science in Physics with a minor in Mechanical Engineering — *Sept. 2006 – June. 2010*

- **University of Michigan** — Ann Arbor, MI
  Masters of Science in Applied and Interdisciplinary Mathematics — *Sept. 2012 – Dec 2014*

- **University of Michigan** — Ann Arbor, MI
  Ph.D. in Physics — *Sept. 2012 – May 2018*
  Thesis: Optimal control of the advection-diffusion equation for effective fluid mixing

- **Udacity: Deep Reinforcement Learning Nanodegree** — *July 2018 — December 2018*

COMPUTER AND PROGRAMMING SKILLS

Python, SQL, Matlab, Pytorch, Keras, Sklearn, Pandas, Numpy, Matplotlib, MongoDB, Git, and Github

MACHINE LEARNING PROJECTS

- **Time-series analysis for stock prediction**
  Creator
  - Can you predict the stock market from the price time series alone? What is easier short-term or long-term predictions? In this study, short-term prediction appears to be much harder than long-term predictions. A simple autoregressive model motivated by physical spring (harmonic oscillator) dynamics is explored. https://github.com/cjm715/stock-prediction

- **Repository of multi-agent OpenAI gym environments**
  Creator
  - 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

- **Udacity's Deep Reinforcement Learning Nanodegree Projects**
  Creator
  - Implemented a Deep Q-Network algorithm to train an agent that seeks food and avoids poison in Unity's 3D virtual environment. See: https://github.com/cjm715/Udacity-drln-p1
  - Implemented a Deep Deterministic Policy Gradient algorithm to train a virtual robotic arm that is attempting to follow a moving target in Unity's Reacher environment. See: https://github.com/cjm715/Udacity-drln-p2
  - Implemented a Deep Deterministic Policy Gradient algorithm to train two agents to play virtual tennis in Unity's Tennis environment. See: https://github.com/cjm715/Udacity-drln-p3

INDUSTRY EXPERIENCE

- **Continental Tires R&D: Pattern, Contour, and Layout** — Hanover, Germany
  Mechanical Engineering Intern — *Fall 2010 – Winter 2011*
  - Simulated the interaction between the tire tread and gravel to predict the likelihood of trapping stones in tire tread grooves to assess the potential threat to tire wear and damage.
  - Contributed to early concept-phase development of tire tread pattern designs for upcoming products.

- **On-Ramp Wireless: Communications Physical Layer** — San Diego, CA
  Systems Engineering Intern — *Summer 2011-Fall 2011*

- Investigated signal interference between ORW's wireless network and WiFi networks.
- Contributed to system design features to eliminate signal interference problems.
- Learned digital communications and signal processing fundamentals.

Academic Research Experience

University of Michigan: Optimal control of fluid mixing (PhD Thesis) Ann Arbor, MI
Graduate Student Researcher *Spring 2013 – May 2018*

- Computationally and analytically studied a series of optimization problems on fluid mixing.
- Discovered that diffusion can limit the mixing effectiveness of incompressible flows in some cases.

Publications

- L. Bromberg, P. C. Michael, J. V. Minervini, **C. J. Miles**, Current lead optimization of cryogenic operation at intermediate temperature in Transactions of the cryogenic engineering conference, AIP Conference Proceedings 1218, 577, 2010
- L. Bromberg, P. C. Michael, J. V. Minervini, **C. J. Miles**, Coolant topology options for high temperature superconducting transmission and distribution systems, in Transactions of the cryogenic engineering conference, AIP Conference Proceedings 1218, 871, 2010
- **C. J. Miles**, C. R. Doering, O. D. Kripfgans, Nucleation pressure threshold in acoustic droplet vaporization, Journal of Applied Physics 120, 034903, 2016
- **C. J. Miles**, C. R. Doering, A shell model for optimal mixing, Journal of Nonlinear Science, 2017, https://doi.org/10.1007/s00332-017-9400-7
- **C. J. Miles**, C. R. Doering, Diffusion-limited mixing by incompressible flows, Nonlinearity, 31, 5, 2018
- **C. J. Miles**, Arthur A. Evans, Michael J. Shelley, and Saverio E. Spagnolie, Active matter invasion of a viscous fluid: unstable sheets and a no-flow theorem arXiv:1803.05543[cond-mat.soft] (accepted to PRL)