MAZIAR RAISSI

Division of Applied Mathematics, Brown University

@ maziar_raissi@brown.edu @ maziar.raissi@gmail.com +1 (202) 812-5606 182 George Street, Providence, RI, 02912
http://www.dam.brown.edu/people/mraissi/ https://maziarraissi.github.io/ https://www.linkedin.com/in/mraissi/
https://github.com/maziarraissi/

EXPERIENCE

Research Assistant Professor

Brown University
Division of Applied Mathematics

January 2016 – Ongoing Providence, RI

- Leading two grants (DARPA and AFOSR) on machine learning, deep learning, and data-driven scientific computing.
- Released more that 15 open-source C++, Cuda, Python and Matlab projects on GitHub.
- The applied mathematics program at Brown University is ranked 4 among the best graduate schools in the US.

Quantitative Research Associate

World Bank Group
International Finance Corporation (IFC)
Treasury Quantitative Analysis

February 2015 – August 2015 Washington, DC

EDUCATION

Ph.D. in Applied Mathematics
M.A. in Economics

University of Maryland

2013 – 2016 College Park, MD

- Dissertation Topic: Conic Economics
- Advisor: Dilip Madan
- The applied mathematics program at UMD is ranked 13 among the best graduate schools in the US.
- The economics program at UMD is ranked 21 among the best graduate schools in the US.

Ph.D. in Applied Mathematics

George Mason University

2011 – 2013 Fairfax, VA

- Dissertation Topic: Multi-fidelity Stochastic Collocation Methods
- Advisor: Padmanabhan Seshaiyer

M.S. in Applied Mathematics

Isfahan University of Technology

2008 – 2011 Isfahan, Iran

- Dissertation Topic: Numerical Continuation of Connecting Orbits of Maps in Matlab
- Advisors: Reza Mokhtari and Reza Khoshsiar Ghaziani

B.S. in Applied Mathematics

University of Isfahan

2004 – 2008 Isfahan, Iran

SKILLS

Matlab ●●●●●
Python (NumPy/SciPy) ●●●●○
Scikit-learn & StatsModels ●●●○○
R ●●●○○

Object Oriented Programming ●●●●○
C & C++ & Cuda ●●●●○
Parallel Computing (MPI) ●●●○○

Deep Learning ●●●●●
Tensorflow ●●●●●
PyTorch & Autograd ●●●●●
Theano & Caffe ●●●○○

Big Data ●●●●○
Apache Spark (Scala) ●●●○○

Mathematica ●●●●○
Fortran ●●●○○
Maple ●●○○○

SQL ●●●●○
Pandas ●●●●○
Stata & EViews ●●●○○
VBA ●●●○○
SAS & SPSS ●●○○○

Flask ●●●○○
Heroku ●●●○○
NLTK & spaCy ●●●○○

Bloomberg ●●●○○
Numerix ●●○○○
Summit ●●○○○

LANGUAGES

Farsi (Persian) ●●●●●
English ●●●●●
French ●●●○○
German ●●○○○

AWARDS

Office of Provost Fellowship
George Mason University

PATENTS

Physics Informed Learning Machines
U.S. Provisional Patent Application 6248319, March 29, 2017.

PUBLICATIONS

Dissertations

[1] Maziar Raissi. "Conic Economics". PhD thesis. University of Maryland, College Park, 2016. URL: http://bit.ly/2hkIHZ1.

[2] Maziar Raissi. "Multi-fidelity Stochastic Collocation". PhD thesis. George Mason University, 2013. URL: http://bit.ly/2xggpcn.

Journal Articles

[3] Maziar Raissi. "Deep Hidden Physics Models: Deep Learning of Nonlinear Partial Differential Equations". In: *Journal of Machine Learning Research* 19.25 (2018), pp. 1–24. URL: http://jmlr.org/papers/v19/18-046.html.

[4] Maziar Raissi, Paris Perdikaris, and George Em Karniadakis. "Physics-Informed Neural Networks: A Deep Learning Framework for Solving Forward and Inverse Problems Involving Nonlinear Partial Differential Equations". In: *Journal of Computational Physics* (to appear). https://arxiv.org/abs/1711.10561 and https://arxiv.org/abs/1711.10566.

[5] Maziar Raissi, Zhicheng Wang, Michael S Triantafyllou, and George Em Karniadakis. "Deep Learning of Vortex Induced Vibrations". In: *Journal of Fluid Mechanics* (to appear). URL: https://arxiv.org/abs/1808.08952.

[6] Maziar Raissi and George Em Karniadakis. "Hidden Physics Models: Machine Learning of Nonlinear Partial Differential Equations". In: *Journal of Computational Physics* 357 (2018), pp. 125–141. URL: https://bit.ly/2D7oi4p.

[7] Maziar Raissi, Paris Perdikaris, and George Em Karniadakis. "Numerical Gaussian Processes for Time-Dependent and Nonlinear Partial Differential Equations". In: *SIAM Journal on Scientific Computing* 40.1 (2018), A172–A198. URL: https://bit.ly/2K5rIXL.

[8] Maziar Raissi, Paris Perdikaris, and George Em Karniadakis. "Machine Learning of Linear Differential Equations using Gaussian Processes". In: *Journal of Computational Physics* 348 (2017), pp. 683–693. URL: http://bit.ly/2fC9ccs.

[9] Maziar Raissi, Paris Perdikaris, and George Em Karniadakis. "Inferring Solutions of Differential Equations using Noisy Multi-fidelity Data". In: *Journal of Computational Physics* 335 (2017), pp. 736–746. URL: http://bit.ly/2jMANfP.

[10] Paris Perdikaris, Maziar Raissi, Andreas Damianou, Neil D. Lawrence, and George Em Karniadakis. "Nonlinear Information Fusion Algorithms for Data-efficient Multi-fidelity Modelling". In: *Proceedings of the Royal Society of London A: Mathematical, Physical and Engineering Sciences* 473.2198 (2017). URL: http://bit.ly/2w7HJWx.

[11] Paul Cashin, Kamiar Mohaddes, Maziar Raissi, and Mehdi Raissi. "The Differential Effects of Oil Demand and Supply Shocks on the Global Economy". In: *Energy Economics* 44 (2014), pp. 113–134. URL: http://bit.ly/2yrqv88.

[12] Maziar Raissi and Padmanabhan Seshaiyer. "A Multi-fidelity Stochastic Collocation Method for Parabolic Partial Differential Equations with Random Input Data". In: *International Journal for Uncertainty Quantification* 4.3 (2014). URL: http://bit.ly/2yryAJR.

[13] Maziar Raissi and Padmanabhan Seshaiyer. "Application of Local Improvements to Reduced-order Models to Sampling Methods for Nonlinear PDEs with Noise". In: *International Journal of Computer Mathematics* 95.5 (2018), pp. 870–880. URL: http://bit.ly/2jLMsLR.

RESEARCH INTERESTS

Within the field of applied mathematics, my research interests span the areas of probabilistic machine learning, deep learning, data-driven scientific computing, multi-fidelity modeling, uncertainty quantification, big data analysis, economics, and finance.

Watch my talk: http://bit.ly/2yvfsux

RECENT TALKS

- Department of Mathematics and Statistics, University of Maryland, October 5, 2018, Baltimore County, MD, USA.
- Schlumberger-Doll Research Center, September 6, 2018, Cambridge, MA USA.
- The 13th World Congress in Computational Mechanics, July 22–27, 2018, New York City, NY, USA.
- SIAM Annual Meeting, July 9–13, 2018, Portland, OR, USA.
- School of Computational Science and Engineering, Georgia Institute of Technology, February 8, 2018, Atlanta, GA, USA.
- DARPA EQUiPS PI Review Meeting, February 12–13, 2018, Arlington, VA, USA.
- School of Natural Sciences, University of California, January 26, 2018, Merced, CA, USA.
- Michigan Institute for Computational Discovery and Engineering, University of Michigan, December 4, 2017, Ann Arbor, MI, USA.
- Schlumberger-Doll Research Center, October 5, 2017, Cambridge, MA USA.
- Department of Mechanical Engineering, Massachusetts Institute of Technology, September 14, 2017, Cambridge, MA, USA.
- DARPA EQUiPS PI Review Meeting, August 16–18, 2017, Arlington, VA, USA.
- SIAM Annual Meeting, July 10–14, 2017, Pittsburgh, PA.
- ICERM Workshop on Probabilistic Scientific Computing, June 5–9, 2017, Providence, RI, USA. Video:
- DARPA EQUiPS PI Review Meeting, March 28–30, 2017, Austin, TX, USA.
- DARPA EQUiPS PI Review Meeting, September 21–23, 2016, Arlington, VA, USA.
- DARPA EQUiPS PI Review Meeting, March 22–24, 2016, Stanford University, CA, USA.

PUBLICATIONS (CONTINUED)

Preprints

[14] Maziar Raissi, Alireza Yazdani, and George Em Karniadakis. "Hidden Fluid Mechanics: A Navier-Stokes Informed Deep Learning Framework for Assimilating Flow Visualization Data". In: *arXiv preprint arXiv:1808.04327* (2018). URL: https://arxiv.org/abs/1808.04327.

[15] Maziar Raissi. "Forward-Backward Stochastic Neural Networks: Deep Learning of High-dimensional Partial Differential Equations". In: *arXiv preprint arXiv:1804.07010* (2018). URL: https://arxiv.org/abs/1804.07010.

[16] Maziar Raissi, Paris Perdikaris, and George Em Karniadakis. "Multistep Neural Networks for Data-driven Discovery of Nonlinear Dynamical Systems". In: *arXiv preprint arXiv:1801.01236* (2018). URL: https://arxiv.org/abs/1801.01236.

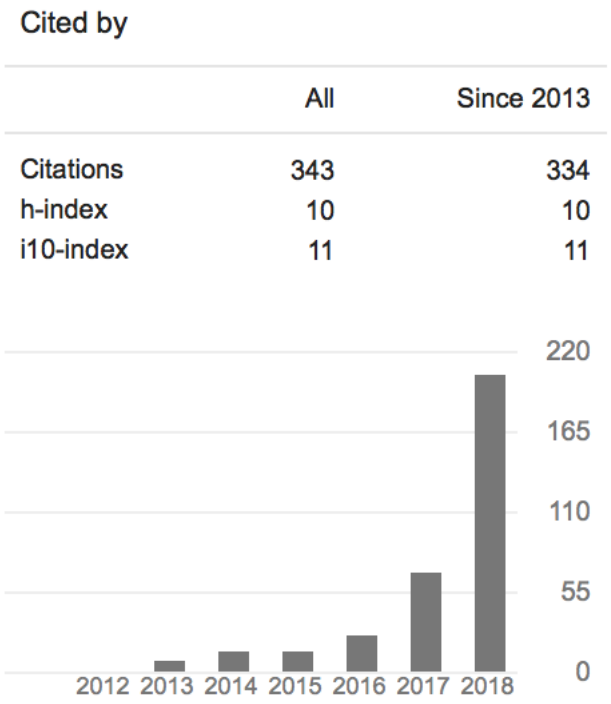
[17] Mamikon Gulian, Maziar Raissi, Paris Perdikaris, and George Karniadakis. "Machine Learning of Space-Fractional Differential Equations". In: *arXiv preprint arXiv:1808.00931* (2018). URL: https://arxiv.org/abs/1808.00931.

[18] Maziar Raissi. "Parametric Gaussian Process Regression for Big Data". In: *arXiv preprint arXiv:1704.03144* (2017). URL: https://arxiv.org/abs/1704.03144.

[19] Maziar Raissi and George Karniadakis. "Deep Multi-fidelity Gaussian Processes". In: *arXiv preprint arXiv:1604.07484* (2016). URL: https://arxiv.org/abs/1604.07484.

GOOGLE SCHOLAR PROFILE

As of Oct 14, 2018.



TEACHING

- Gaussian Processes and Deep Learning, Tutorial, Brown University, Spring 2017.
- Introduction to Linear Algebra, Teaching Assistant, University of Maryland – College Park, Fall 2015.
- Calculus 3, Teaching Assistant, University of Maryland – College Park, Fall 2014.
- Research Experience for Undergraduate Students, Graduate Mentor, University of Maryland – College Park, Summer 2014.
- Linear Algebra for Scientists and Engineers, Teaching Assistant, University of Maryland – College Park, Spring 2014.
- Differential Equations, Teaching Assistant, University of Maryland – College Park, Fall 2013.
- Research Experience for Undergraduate Students, Graduate Mentor, George Mason University, Summer 2012 & 2013.

REFERENCES

George Karniadakis
@ george_karniadakis@brown.edu
Division of Applied Mathematics
Brown University

Stuart Geman
@ stuart_geman@brown.edu
Division of Applied Mathematics
Brown University

Michael Triantafyllou
@ mistetri@mit.edu
Department of Mechanical Engineering
Massachusetts Institute of Technology

Dilip Madan
@ dmadan@rhsmith.umd.edu
Department of Finance
University of Maryland – College Park

Padmanabhan Seshaiyer
@ pseshaiy@gmu.edu
Department of Mathematical Sciences
George Mason University

Peyman Givi
@ peg10@pitt.edu
Department of Mechanical Engineering
University of Pittsburgh

Mark Girolami
@ m.girolami@warwick.ac.uk
Department of Statistics
University of Warwick

Houman Owhadi
@ owhadi@caltech.edu
Department of Computing and
Mathematical Sciences
California Institute of Technology