

# Pouria Mistani

Computational Scientist

Work Authorization:  
Permanent Resident

- 777 Madrona Walk, Apt B,  
Santa Barbara, CA 93117
- +1 951 386 9775
- <http://www.pouriamistani.com>
- My LinkedIn Profile
- p.a.mistani@gmail.com

## Hard Skills

- Multivariate Calculus, Statistics,  
Linear Algebra, Stochastic  
Processes
- Machine Learning,  
Scientific Computing
- Data Intuition Extraction
- Python, C/C++, HTML
- Tensorflow, Keras, Scikit-Learn,  
Scipy, Pandas, Boost, GSL
- SQL, Apache Spark
- Matplotlib, ParaView, Seaborn
- MPI, PETSc, p4est
- Linux, Mac OS, Windows

## Soft Skills

- Multi-disciplinary
- Fast-paced
- Critical Thinking
- Problem Solving
- Team Player
- 6 years experience in several  
scientific collaborations
- Communication
- 10 years of teaching  
experience

## Certificates



Fundamentals of Scalable  
Data Science



Applied AI with Deep  
Learning



Advanced Machine Learning  
and Signal Processing

## Work Experience

- 2016 – now **Research/Teaching Assistant** University of California Santa Barbara  
Developed two parallel computing softwares to numerically integrate  
nonlinear PDEs. Also I developed a stochastic model based on data.
- 2013 – 2016 **Research/Teaching Assistant** University of California Riverside  
Analyzed terabytes of high-dimensional datasets produced by the  
illustris simulations of the Universe, and developed a theory for  
assembly of dwarf galaxies from data.
- 2014 – 2014 **Visiting Scholar** Harvard University  
Developed several Python routines to effectively filter through  
illustris datasets.
- 2012 – 2013 **Scientific Software Developer**  
Ministry of Science, Research and Technology, Iran

## Education

- 2016 – now **PhD in Mechanical Engineering** University of California, Santa Barbara  
Focus: Computational Science and Engineering (GPA: 3.95/4.0)
- 2013 – 2016 **MS Physics** University of California, Riverside  
Focus: Computational Astrophysics (GPA: 3.95/4.0)
- 2009 – 2013 **BS Physics** Sharif University of Technology  
Focus: Astronomy (GPA: 18.45/20.0)
- 2008 – 2013 **BS Aerospace Engineering** Sharif University of Technology  
Focus: Astronautics (GPA: 18.45/20.0)

## Projects

**Inverse PDEs** </> Python, Tensorflow, Keras, Linux  
(Machine Learning)  
2019-now  
We developed the “Blended Inverse-PDE Networks” (BIPDE-Nets)  
that combine traditional methods for numerical computations  
of PDEs with modern deep learning architectures to discover  
hidden fields in data. BIPDE-Nets seamlessly incorporate domain-  
knowledge about physics of the problem.

**Electroporation** </> C++, Petsc, Python, Scikit-Learn, Scipy, Tensorflow, Keras,  
(Biophysics)  
2016-now  
Visualization, Linux  
We numerically solved partial differential equations with nonlinear  
boundary conditions on tens of thousands of interfaces with  
arbitrary geometries. We used a finite volume discretization on  
adaptive interface-fitted Voronoi grids. I implemented more than  
5,000 lines of parallel C++ code, tested, then ran it on Stampede2  
supercomputer on 2,048 processors. I used ParaView to visualize  
the results, and I extensively analyzed the datasets in Python. The  
product is a reduced order model that predicts observations with  
minimal computations.

**Epitaxy** </> C++, Petsc, Boost, p4est, Visualization, Linux  
(Materials)  
2016-2019  
We developed a novel approach for simulating epitaxial growth  
in parallel. In this approach we made use of a forest of quadtree  
adaptive grids using p4est library in a parallel environment. This  
work extended previous studies by combining mesh adaptivity and  
multi-core parallelism that enabled simulations of mound formation  
in orders of magnitude larger domains. We used C++ using parallel  
framework Petsc as an interface to BLAS and LAPACK linear algebra  
libraries, as well as Boost for fast mathematical operations.

**Dwarf Galaxies** </> Python, C, MPI, GSL, matplotlib, Scipy, Scikit-Learn, Pandas,  
(Astrophysics) Linux  
2014-2016  
I analyzed 250TB of correlated datasets generated by the Illustris  
cosmological and hydrodynamical simulation suite to study the  
assembly of dwarf galaxies. I developed a semi-analytic model for  
the formation and stripping of globular clusters that support our  
findings.

# Pouria Mistani

Computational Scientist

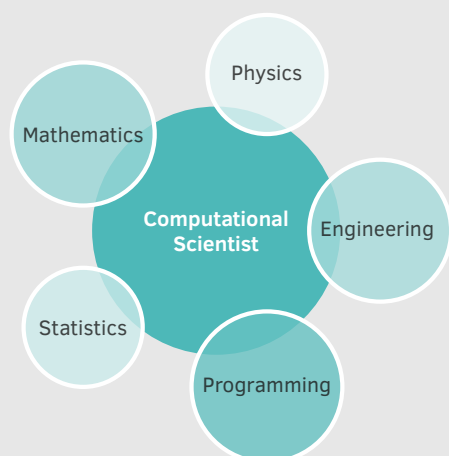
Work Authorization:  
Permanent Resident

## About Me

I build multiscale mathematical models from big data. I develop parallel scientific computing softwares (C++ multi-core) to generate and analyze large datasets, using adaptive mesh refinement and in parallel environments.

I have extensive experience in developing data analysis pipelines and visualizations using Python, which I leverage to develop physics-informed predictive models.

## Analytics



## Programming Skills

>\_ Python

>\_ C++

## Memberships



Society for Industrial and Applied Mathematics, USA



National Elite Foundation, Iran

## Awards

- 2020 **Graduate Division Dissertation Fellowship Award**  
University of California, Santa Barbara
- 2019 **Travel award for SIAM conference on computational science and engineering**  
Spokane, Washington, USA  
**Awarded 740,082 SUs computing allocation on Stampede supercomputer**  
XSEDE TACC
- 2016 **FIELDS fellowship for big data and visualization**  
NASA MIRO program
- 2015 **Michael Devirian award for outstanding research by a 2nd year graduate student**  
University of California, Riverside
- 2013 **Winner of dean's distinguished fellowship award**  
University of California, Riverside
- 2007 **4 year "National Elite Foundation Undergraduate Fellowship Award"**  
Ministry of Education, Iran
- 2007 **Silver medal in the 3rd national olympiad in astronomy**  
Ministry of Education, Iran

## Publications

- 2020 **A fractional stochastic theory for interfacial polarization of multicellular systems**  
Pouria Mistani, S Pakravan, F Gibou  
*arXiv - under review*
- 2020 **Solving inverse-PDE problems with physics-aware neural networks**  
S Pakravan, Pouria Mistani, MA Calvo, F Gibou  
*arXiv - under review*
- 2019 **A parallel Voronoi-based approach for meso-scale simulations of cell aggregate electroporation**  
Pouria Mistani, A Guittet, C Poignard, F Gibou  
*Journal of Computational Physics*
- 2019 **Towards a tensor network representation of complex systems**  
Pouria Mistani, S Pakravan, F Gibou  
*Springer International Publishing*
- 2019 **Tensor network renormalization as an ultra-calculus for complex system dynamics**  
Pouria Mistani, S Pakravan, F Gibou  
*Springer International Publishing*
- 2018 **The island dynamics model on parallel quadtree grids**  
Pouria Mistani, D Bochlov, A Guittet, J Schneider, D Margetis, C Ratsch, F Gibou  
*Journal of Computational Physics*
- 2016 **On the assembly of dwarf galaxies in clusters and their efficient formation of globular clusters**  
Pouria Mistani, L Sales, A Pillepich, R Sanchez-Janssen, M Vogelsberger, D Nelson, V Rodriguez-Gomez, P Torrey, L Hernquist  
*Monthly Notices of Royal Astronomical Society*

## Teaching

ME	Engineering Dynamics (main instructor)	UC Santa Barbara
ME	Statics	UC Santa Barbara
ME	Fluid Mechanics I, II (twice)	UC Santa Barbara
ME	Engineering Vibrations (twice)	UC Santa Barbara
PHYS	Intermediate Mechanics	UC Santa Barbara
PHYS	General Physics Discussions (sections 2A, 2B, 2C)	UC Riverside
PHYS	Physics General Labs (sections 2LA, 2LC, 2C)	UC Riverside
AE	Orbital Mechanics (5 semesters)	Sharif University of Technology
AE	Aircraft Design II	Sharif University of Technology