

Pouria A. Mistani

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Research Interests Computational science and engineering (CSE); Level-set method; High Performance Computing (HPC); Multi-scale modeling & simulations of interface physics; scientific data inference.

Education

PhD in Mechanical Engineering Sep 2016 - ongoing
University of California Santa Barbara, USA
Concentrations in Computational Science and Engineering
overall GPA 4.0/4.0
Advisor: Prof.Frederic Gibou

Graduate Researcher June 2014 - June 2016
University of California Riverside, USA
Concentrations in Computational Astrophysics

MSc in Physics Sep 2013 - June 2014
University of California Riverside, USA
Concentrations in Computational Astrophysics
overall GPA 3.95/4.0

BSc in Physics Sep 2009 - June 2013
Sharif University of Technology, Tehran, Iran
overall GPA 18.45/20.00*

BSc in Aerospace Engineering Sep 2008 - June 2013
Sharif University of Technology, Tehran, Iran
overall GPA 18.45/20.00*

* This is the combined GPA of both majors.

Professional Experience

Visiting Scholar, Institute for Theory and Computation (ITC), Center for Astrophysics (CfA), Harvard University June 2014

Software Developer, Research Center for Intelligent Signal Processing Ministry of Science, Research and Technology (MSRT), Iran 2012 - 2013
Developed a real-time star identification system for attitude determination of satellites

Internship in Design and Build of a Helmholtz Coil and a Sun Sensor Summer 2012
With Prof.Nima Assadian, Department of Aerospace Engineering, Sharif University of Technology

Computer Skills

<u>Languages:</u>	C/C++, Python, Java, Javascript, MATLAB, Fortran, bash, html
<u>Libraries:</u>	MPI, Petsc, Boost, fftw, gsl, Pandas, NumPy, Scipy, H5Py, Pyfits, Matplotlib
<u>Software:</u>	COMSOL, ParaView, Qt Creator, Eclipse, Microsoft Office, Latex
<u>OS:</u>	Linux, Mac OS, Windows
<u>HPC facilities:</u>	TACC Stampede, SDSC Comet, Harvard Odyssey, UCR FOAM/FIONA
<u>Job Management:</u>	SLURM, Torque, NebulOS

Publications

Journals

- **A Parallel Voronoi-based Approach for Meso-scale Simulations of Cell Aggregate Electropermeabilization**
Pouria Mistani; Arthur Guittet; Clair Poignard; Frederic Gibou
Journal of Computational Physics, Elsevier. under review, 2018.
- **The Island Dynamics Model on Parallel Quadtree Grids**
Pouria Mistani; Arthur Guittet; Daniil Bochkov; Joshua Schneider; Dionisios Margetis; Christian Ratsch; Frederic Gibou
Journal of Computational Physics, Elsevier. published, 2018.
- **On the Assembly of Dwarf Galaxies in Clusters and their Efficient Formation of Globular Clusters**
Mistani, Pouria A.; Sales, Laura V.; Pillepich, Annalisa; Sanchez-Janssen, Ruben; Vogelsberger, Mark; Nelson, Dylan; Rodriguez-Gomez, Vicente; Torrey, Paul & Hernquist, Lars
Monthly Notices of the Royal Astronomical Society, Oxford University Press. published, 2016.

Conference presentations

- “Multi-scale simulations of cell aggregate electropermeabilization”, Poster Presentation at Southern California Applied Mathematics Symposium (SOCAMS) 2018, University of California Santa Barbara.
by **Pouria Mistani**, and Frederic Gibou.
- “Multi-scale simulations of epitaxial growth: mound formation”, Poster Presentation at Southern California Applied Mathematics Symposium (SOCAMS) 2018, University of California Santa Barbara.
by **Pouria Mistani**, and Frederic Gibou.
- “Velocity Dispersion Profile of Cetus Dwarf Spheroidal Galaxy”, Poster Presentation at 8th Sackler Conference on Dark Matter 2014, CfA, Harvard University.
by **Pouria Mistani**, **Soroush Sotoudeh**.

Book Chapters

- “Tensor network representation of complex systems”; To be published in second edition of the *Sustainable Interdependent Networks, from Theory to Applications*, Springer 2018,
by **Pouria Mistani**, Samira Pakravan, Frederic Gibou.
- “Tensor network renormalization as an ultra-calculus for complex system dynamics”; To be published in second edition of the *Sustainable Interdependent Networks, from Theory to Applications*, Springer 2018,
by **Pouria Mistani**, Samira Pakravan, Frederic Gibou.

Projects

Parallel Simulations of Epitaxial Growth on Quadtree Grids

University of California Santa Barbara

September 2016 - ongoing

This project introduces a novel approach for efficiently simulating epitaxial growth using the island dynamics model. In this approach we make use of a forest of quadtree grids in a parallel environment in the context of level-set method.

Using: MPI, PETSC, Boost, C++

Parallel Simulations of Cell Aggregate Electroporation

University of California Santa Barbara

September 2016 - ongoing

Simulations of cell aggregate electroporation in a parallel environment and on Octree grids. We investigate different aspects of cell aggregate electroporation in a huge cluster of cells seeking an improvement to cancer treatment techniques using electric pulses to enhance cell membrane permeability of drugs.

Using: MPI, PETSC, C++

Environmental Dependence of Galaxy Properties

April 2016 - ongoing

University of California Riverside, Universidad Nacional Autonoma de Mexico (UNAM)

The MIP simulations are a set of Dark Matter only simulations with shifted small-scale fluctuations in their initial conditions while the large-scale modes are held fixed. We investigate the galaxy properties dependence on the variations in the environment by first populating these dark matter haloes with baryonic matter using the semi-analytic models.

Using: Python, Galacticus

Feedback Processes in Dwarf Galaxies

University of California Riverside

October 2015 - March 2016

I developed a model for feedback processes in the dwarf galaxy regime. I implemented this model into the AREPO moving mesh code written in C language using the MPI library.

Using: MPI, C

Assembly of Dwarf Galaxies - the Illustris Simulations

University of California Riverside

September 2014 - January 2016

We studied the assembly of dwarf galaxies using the Illustris hydrodynamical and cosmological simulations. As part of this project, I implemented a semi-analytic model for formation of globular clusters on top of the Illustris simulations.

Using: Python, Fortran

Stabilization of Rigid Body Dynamics and Orbital Dynamics Using Canonical Approach

Sharif University of Technology

September 2012 - June 2013

In this project, the reduction of the rigid body problem and orbital dynamics by canonical Serret-Andoyer and Delaunay variables respectively is discussed and stabilizing control for both of them is presented using the method introduced by Pini Gurfil.

Using: MATLAB

Honors and Awards

- Finalist for the 3rd edition of the IEEE Entrepreneurship Forum and Startup Contest
IEEE Robotics and Automation Society (IEEE RAS) 2017
- Awarded 740,082 SUs computing allocation on Stampede supercomputer 2016
Proposal: “Dwarf Galaxies as Cosmological Laboratories of Galaxy Formation”
PI: Laura Sales, Co-PIs: **Pouria A.Mistani**, Peter Creasey, Federico Marinacci
- 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 2015
- Winner of Dean’s Distinguished Fellowship Award, UC Riverside 2013
- Merit based admission to graduate program in Aerospace Engineering 2013
1st rank among BSc students in Aerospace Engineering Department
Sharif University of Technology
- Top 0.1% (rank 258) among more than 300,000 high school students in the National University Entrance Exam, Iran 2008
- 4 year “National Elite Foundation Undergraduate Fellowship Award”
Ministry of Education, Iran 2007
- National Silver Medal in 3rd National Astronomy Olympiad
Ministry of Education, Iran 2007
- Ranked 1st in National Olympiad on Astronomy, Basij Organization, Iran 2006

Teaching Experience

Lecturer

- *University of California Santa Barbara, Department of Mechanical Engineering:*
ME16: Engineering Dynamics, Undergraduate Course, Spring 2018.

Teaching Assistant

University of California Santa Barbara, Department of Mechanical Engineering:

- Fluid Mechanics II, Prof. Paolo Luzzatto-Fegiz
- Statics, Prof. Mathew Begley

University of California Riverside, Department of Physics:

- Physics General Labs, 6 classes (sections 2LA, 2LC, 2C)
- General Physics Discussions, 12 classes in total (2A, 2B, 2C)

Sharif University of Technology, Department of Aerospace Engineering:

- Orbital Mechanics (5 semesters), Prof. Nima Assadian, Prof. S.H. Pourtakdoust
- Aircraft Design II, Prof. Afshin Banazadeh