Hatef Dastour, PhD

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Education

- Ph.D., Geomatics Engineering, University of Calgary — May 2022 - Present, Calgary, Canada,
- Ph.D., Mathematics and Statistics, University of Calgary — January 2016 - December 2019, Calgary, Canada,
- M.S., Applied Mathematics, Damghan University — September 2010 - September 2012, Damghan, Iran,
- B.S., Applied Mathematics, Payame Noor University — September 2006 - July 2010, Tehran, Iran,

Research Interests

Environmental modeling, remote sensing, big data analysis, mathematical modeling, scientific computations, and data science

Working and Research Experience

- **Research Associate** — May 2022 - Present,
  Department of Geomatics Engineering, Schulich School of Engineering, University of Calgary, Alberta, Canada
  - Co-supervised graduate students and assisted them in identifying and carrying out the subsequent phases of their research project.
  - Modeled monthly streamflow with highly accurate predictions and analyzed the results.
  - Applied open-source deep learning models in transfer learning for the classification of labeled Sentinel-2 images in Land Use/Land Cover (LULC) analysis.
  - Analyzed climate and vegetation in the Athabasca River Basin in Canada using wavelet-based spatiotemporal techniques.
  - Analyzed and modeling of the water and ice dynamics for lakes through remote sensing data.
- **Data Scientist/Research Scientist** — July 2020 - September 2022,
  Earth & Space Inc., Calgary, AB, Canada
  - Project manager and team leader. Delivered milestones and supervised team members.
  - Utilized Google Big data and Google Cloud platform to develop a Python package for visualizing east coast fishery data.
  - Provided data science-based consultations to clients and partner companies.
- **Research Associate** — November 2021 - March 31, 2022,
  Department of Geomatics Engineering, Schulich School of Engineering, University of Calgary, Alberta, Canada
  - Conducted analysis of extended periods of river flow and climate patterns in northern Canada.
  - Employed wavelet-based spatiotemporal techniques to examine climate and vegetation in the Athabasca River Basin in Canada.
  - Modeled and Analyzed water and ice dynamics in lakes using remote sensing data and climate data.

- **Data Science Developer** January 2020 - March 25, 2020,
  StellarAlgo Corp., Calgary, AB, Canada

  - Designed, developed, and refined predictive models for selected business verticals.
  - Discovered and communicated relevant insights to key stakeholders for smarter decision-making.
  - Explored opportunities for combining existing and new data sources to discover insights.
  - Supported requirements gathering and data engineering efforts related to building analytics data sets.
  - Participated in data analysis and data architecture direction with valuable client-facing development insights.

- **Graduate Student** January 2016 - December 2019
  Department of Mathematics and Statistics, University of Calgary, Calgary, AB, Canada

  Developed several robust and higher-order finite difference methods for the wave equation in both frequency and time domains.

- **Research Associate** February 2012 - May 2015,
  School of Mathematics, Iran University of Science and Technology, Tehran, Iran

  Developed numerical methods using the Mollification method and the Marching scheme to estimate unknown parameters in inverse heat conduction problems.

- **Graduate Student** October 2010 - August 2012,
  School of Mathematics and Computer science, Damghan University, Damghan, Iran

  Developed some numerical schemes based on the application of the Marching scheme and the Mollification method for finding the stable numerical solution of a class of semi-linear Cauchy problems.

Teaching Experience

- **Sessional Instructor** August 2022 - Present,
  Department of Mathematics & Computing, Mount Royal University, Calgary, AB, Canada

  Spring 2023:
  - Instructor for MATH 2333 (Statistics for Life Sciences). Responsible for all course activities.

  Winter 2023:
  - Instructor for MATH 2233 (Statistics for Biological Sciences). Responsible for all course activities except Final examinations. Common textbook and a common final exam for three lectures.
  - Instructor for MATH 2234 (Concepts of Mathematical Statistics). Responsible for all course activities. Common textbook and prepared a common final exam for two lectures.

  Fall 2022:
  - Course coordinator and instructor for MATH 3101 (Numerical Analysis). Responsible for all course activities.
  - Instructor for MATH 1203 (Linear Algebra for Scientists and Engineers). Responsible for all course activities except Final examinations. Common textbook and a common final exam for three lectures.

- **Sessional Lecturer I/Tutorial instructor** August 2021 - Present,
  Faculty of Arts & Science, University of Lethbridge (Calgary Campus), Calgary, AB, Canada

  Fall 2021 - Fall 2022:
  - Co-Instructor for MATH1510Y (Calculus for Management and Social Sciences). Prepared and taught some lecture classes, and prepared, and taught all tutorial classes.

- **Sessional Instructor** September 2017 - June 2019,
  Department of Mathematics and Statistics, University of Calgary, Calgary, AB, Canada

  - *Spring 2019:* MATH 211 - Linear Methods I - Spring 2019. Responsible for all course activities.
  - *Summer 2018:* MATH 211 - Linear Methods I - Summer 2018. Responsible for all course activities.
  - *Fall 2017:* MATH 275 - Calculus for Engineers and Scientists - Fall 2017 (Through Instructor Training Program). Responsible for preparing and teaching 1/3 of lectures.

- **Graduate Teaching Assistant** January 2016 - December 2019,

Department of Mathematics and Statistics, University of Calgary, Calgary, AB, Canada

Gained teaching experience serving as a teaching assistant for Introductory Calculus (MATH 249), University Calculus I (MATH 265), Calculus for Engineers and Scientists (MATH 275), Multivariable Calculus for Engineers (MATH 277), Differential Equations for Engineers and Scientists (MATH 375), Numerical Analysis I (MATH 391), Numerical Analysis I (AMAT 491) and Numerical Analysis II (AMAT 493).

- **Self-employed Mathematics** October 2010 - August 2015, Tehran, Iran

Peer-reviewed Journal Publications

1. **H. Dastour** and Q. K. Hassan. A comparison of deep transfer learning methods for land use and land cover classification. *Sustainability*, 15(10):7854, 2023. [IF: 3.9; IF Quartile: Q2]
2. **H. Dastour** and Q. K. Hassan. A machine-learning framework for modeling and predicting monthly streamflow time series. *Hydrology*, 10(4):95, 2023. [IF: 3.2; IF Quartile: Q2]
3. **H. Dastour**, A. Gupta, G. Achari, and Q. K. Hassan. A robust regime shift change detection algorithm for water-flow dynamics. *Water*, 15(8):1571, 2023. [IF: 3.4; IF Quartile: Q2]
4. M. S. Zaghloul, E. Ghaderpour, **H. Dastour**, B. Farjad, A. Gupta, H. Eum, G. Achari, and Q. K. Hassan. Long-term trend analysis of river flow and climate in Northern Canada. *Hydrology*, 9(11):197, 2022. [IF: 3.2; IF Quartile: Q2]
5. **H. Dastour**, E. Ghaderpour, M. S. Zaghloul, B. Farjad, A. Gupta, H. Eum, G. Achari, and Q. K. Hassan. Wavelet-based spatiotemporal analyses of climate and vegetation for the Athabasca river basin in Canada. *International Journal of Applied Earth Observation and Geoinformation*, 114:103044, 2022. [IF: 7.5; IF Quartile: Q1]
6. **H. Dastour**, E. Ghaderpour, and Q. K. Hassan. A combined approach for monitoring monthly surface water/ice dynamics of Lesser Slave Lake via Earth observation data. *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, 15:6402–6417, 2022. [IF: 5.5; IF Quartile: Q1]
7. **H. Dastour** and W. Liao. A generalized optimal fourth-order finite difference scheme for a 2D Helmholtz equation with the perfectly matched layer boundary condition. *Journal of Computational and Applied Mathematics*, 394:113544, 2021. [IF: 2.4; IF Quartile: Q1]
8. **H. Dastour** and W. Liao. An optimal 13-point finite difference scheme for a 2D Helmholtz equation with a perfectly matched layer boundary condition. *Numerical Algorithms*, 86(3):1109–1141, 2021. [IF: 2.1; IF Quartile: Q1]
9. **H. Dastour** and W. Liao. A fourth-order optimal finite difference scheme for the Helmholtz equation with PML. *Computers & Mathematics with Applications*, 78(6):2147–2165, 2019. [IF: 2.9; IF Quartile: Q1]
10. W. Liao, Peng Yong, **H. Dastour**, and J. Huang. Efficient and accurate numerical simulation of acoustic wave propagation in a 2D heterogeneous media. *Applied Mathematics and Computation*, 321:385–400, 2018. [IF: 2.1; IF Quartile: Q1]
11. M. Garshasbi and **H. Dastour**[1]. A mollified marching solution of an inverse ablation-type moving boundary problem. *Computational and Applied Mathematics*, 35(1):61–73, 2016. [IF: 1.5; IF Quartile: Q1]
12. M. Garshasbi and **H. Dastour**[1]. Estimation of unknown boundary functions in an inverse heat conduction problem using a mollified marching scheme. *Numerical Algorithms*, 68(4):769–790, 2015. [IF: 2.1; IF Quartile: Q1]
13. M. Garshasbi and **H. Dastour**[1]. Proportional factors estimation in an IHCP. *Journal of Hyperstructures*, 3(1):53–67, 2014.

[1]It is customary in my country of origin, Iran, to see graduate students' names after the name of their supervisor(s) on research papers.

14. M. Garshasbi, **H. Dastour**[1], and M. Jalalvand. A stable numerical solution of an inverse moving boundary problem of heat conduction using discrete mollification approach. *Journal of Advanced Mathematical Modeling*, 2(1):47–60, 2012.

15. M. Garshasbi, P R. Ardabili, and **H. Dastour**[1]. A stable numerical solution of a class of semi-linear Cauchy problems. *Journal of Advanced Research in Dynamical and Control Systems*, 4:56–67, 2012.

Publication Under Review

1. **H. Dastour** and Q. K. Hassan. Analyzing and Modeling the Interaction Between NDVI, LAI, LST, and Climate Data in Various Vegetation Types Across Alberta Province. *Under review by an Environmental Remote Sensing journal*, 2023.

2. M. S. Zaghloul, E. Ghaderpour, **H. Dastour**, A. Gupta, G. Achari, and Q. K. Hassan. Correlation and Coherency Analyses Between Climate and Water Flow of Athabasca River in Canada: Robust Multivariate Regression and Triple Cross-Wavelet Analyses. *Under review by a Hydrology journal*, 2023.

Selected Presentations

1. **H. Dastour** and Q. K. Hassan, "The significance of deep learning for classifying land use and land cover images", The International Geoscience and Remote Sensing Symposium (IGARSS), Pasadena, CA, USA, 16-21 July 2023 (Accepted, but not presented).

2. **H. Dastour** and Q. K. Hassan, "A Machine-Learning Framework for Modeling and Reconstructing Historical Monthly Streamflow Time Series", Canadian Water Association (CWRA) 2023 National Conference, Halifax, NS, Canada, 18-21 June 2023 (Conference Presentation).

3. **H. Dastour**, "Computational Methods for Solving Wave Equation Inverse Problem", Eric Milner Colloquium, University of Calgary, Calgary, AB, Canada, October 14, 2016 (Colloquium Presentation).

4. **H. Dastour**, "A stabilized marching scheme for solving the inverse problem of degenerate diffusion model", the Canadian Society of Applied and Industrial Mathematics (CAIMS 2016), University of Alberta, Edmonton, AB, Canada, June 28, 2016 (Conference Presentation).

5. **H. Dastour**, "A numerical estimation approach for an inverse heat conduction problem", 2016 CMS Summer Meeting, University of Alberta, Edmonton, AB, Canada, June 24, 2016 (Conference Presentation).

6. **H. Dastour**, "A Computational Method for Solving an Inverse Heat Conduction Problem", 2016 CMS Summer Meeting, University of Alberta, Edmonton, AB, Canada, June 25, 2016 (Conference Poster Presentation).

7. **H. Dastour**, "A mollified marching solution of an inverse degenerate diffusion problem in petroleum reservoir", Alberta Mathematics Dialogue 2016, Mount Royal University, Calgary, AB, Canada, April 29, 2016 (Conference Presentation).

Scholarships

- NSERC Doctoral Scholarship[2]. Amount: 63,000 C$ 2023 - 2025
- Ian N. McKinnon Memorial Fellowship. Amount: 3,400C$ 2023 - 2024
- Alberta Innovates Graduate Student Scholarship. Amount: 63,000 C$ 2017 - 2019
- Eric Milner Graduate Scholarship. Amount: 5,500 C$ 2016 - 2017
- PIMS Doctoral Recruitment Scholarship. Amount: 10,000 C$ 2016 - 2017

Awards and Distinctions

- Certificate of Appreciation for having made valuable contributions to the June 2016 Convocation Ceremonies, June 2016.
- Recognition of the Completion of the Instructional Skills Workshop (ISW), September 2016,
- Recognition of outstanding efforts and accomplishments on behalf of the SIAM Chapter at the University of Calgary, Canada May 2017,

[2]NSERC Doctoral Scholarship is one of the most prestigious scholarships in Canada and is highly competitive.

Computer Skills

- Proficiency with computer programming including MATLAB, Python (TensorFlow, PyTorch, Keras, Scikit-Learn, NLP, Pandas, Dask...), R, Julia Programming, and others.
- Proficiency with SQL Server Analysis Services (SSAS).
- Proficiency with visualization tools such as Plotly, Power BI, etc.
- Proficiency with Microsoft Windows, mac-OS, and various Linux distributions as well as office applications, such as Microsoft Office, LaTeX editors, and more.

Professional Services and Committees

- Student researcher speaker in the open educational resource videos for Taylor Institute for Teaching and Learning, University of Calgary
  Calgary, Canada October 2019
- Committee member of the Department of Mathematics and Statistics Graduate committee, University of Calgary
  Calgary, Canada October 2016 - September 2018
- Contribution to 2018 Industrial Problem Solving Workshop (IPSW), University of Calgary
  Calgary, Canada August 19, 2018 - August 24, 2018
- Served as a member of the Department of Mathematics and Statistics Head Search Committee, University of Calgary
  Calgary, Canada March 2018
- Instructor of Programming Workshop at 2017 CMS Math Camp (Alberta), University of Calgary
  Calgary, Canada July 2017
- Contribution to the June 2016 convocation ceremonies, University of Calgary
  Calgary, Canada June 2016
- The vice-president academic of Graduate University Mathematics Society (GUMS), University of Calgary
  Calgary, Canada September 2016 - September 2018
- The founder and president of University of Calgary SIAM Student Chapter, University of Calgary
  Calgary, Canada January 2017 - September 2018
- Organizer of the University of Calgary Chapter of SIAM Biweekly Seminar Series
  Calgary, Canada February 2017 - April 2018
- Organizer of Calgary Applied and Industrial Mathematical Sciences Conference
  Calgary, Canada May 21, 2017 - May 22, 2017

Languages

English and Persian (Farsi)