Davood Damircheli

Curriculum Vitae

Dep. of Math and Stat
Louisiana state University
Baton Rouge, LA, USA
✆ *662-694-0182*
✉ *ddamircheli@lsu.edu*

Positions

2023- present **Postdoc** , *Engineering Department, MSU*, Starkville, USA.
- HPC
- Peridynamic Theory
- Microstructures of Random Materials
- Non-local modeling for understanding the fracture process

2018- 2022 **PhD Candidate and Research Assistant** , *Engineering Department, MSU*, Starkville, USA.
- Machine-learned surrogate fluid-thermal-loading database F(HPC enabled surrogate models and data analysis)
- PDE-constraint optimization
- Discontinuous Petrov Galerkin method
- Variational inequalities and plasticity

2016- present **PhD Candidate**, *Mathematics and statistic Department, MSU*, Starkville, USA.
- Credit risk modeling under a regime-switching synchronous-jump tempered stable Lévy processes
- Credit migration risk problem
- Fractional differential equations in finance

2012-2014 **Research Assistant**, *Institute for Advanced Studies in Basic Sciences (IASBS)*, Zanjan, Iran .
- Partial integro-differential equations with the free boundary feature
- Numerical integration of stochastic boundary value problems

2015- 2016 **Risk Expert and Consultant** , *Risk Department, Tourism Bank*, Tehran, Iran.
- Conducted Liquidity Risk Modeling, ALM Implementation, Cash Flow Management using MATLAB
- Implemented Gap Analysis, Liquidity Stress Testing using MATLAB
- Developed credit risk analysis with machine learning techniques (SVM and K-means with MATLAB packages)

2014-2015 **Risk Expert and Consultant** , *Risk Department, Iranian Hekmat Bank*, Tehran, Iran.
- Assisted in implementing liquidity risk modeling, ALM Implementation, Cash flow management
- Design and implemented Gap Analysis, LaR, Cash Flow at Risk, High-Order ES

Education

2016-present **Ph.D. in Applied Mathematics**, *Mississippi State University (MSU)*, Starkville, USA.

2018-2022	**Ph.D. in Computational Engineering**, *Mississippi State University (MSU)*, Starkville, USA.
2008-2011	**M.Sc. in Applied-Financial Mathematics**, *Institute for Advanced Studies in Basic Sciences (IASBS)*, Zanjan, Iran.
2003-2008	**B.S. in Mathematics**, *Imam Khomeini International University*, Qazvin, Iran.

Publications

Papers

○ **Damircheli, D.**, Razzaghi, M., 2023 *On a Collocation Method Based on Generalized Taylor Wavelets Method for Option Pricing, and Greeks under Fractional Black Scholes model in Sub-diffusive Regime.*, **Submitted.**

○ **D. Damircheli**, *On a stable methodology for Option Pricing: Vanilla and Exotic Options.*, **Submitted.**

○ **D. Damircheli**, *Finite Element Method for Solution of Credit Rating Migration Problem Model.*, **submitted 2021.**

○ **D. Damircheli**, Mohsen Razzaghi ,Seyed-Mohammad-Mahdi Kazemi, Ali Foroush Bastani *On Numerical Solution of Structural model for the Probability of Default under a Regime-Switching Synchronous-Jump Tempered Stable Lévy Model with Desingularized Meshfree Collocation method.*, **Engineering Analysis with Boundary Elements.**

○ **D. Damircheli**, Manav Bhatia *Solution Approaches and Sensitivity Analysis of Variational Inequalities.*, **AIAA Scitech 2019 Forum. 2019.**

○ A. Foroush Bastani, **D. Damircheli** *An adaptive algorithm for solving stochastic multi-point boundary value problems*, **Numerical Algorithms**,2017, 1-25.

○ A. Foroush Bastani, Z. Ahmadi, **D. Damircheli**, *A Radial Basis Collocation Method for Pricing American Options under Regime Switching Jump-Diffusion Models*, **Journal of Applied Numerical Mathematics**, 2013, 65, 79-90.

Presentation(Selected)

○ *Solution Approaches and Sensitivity Analysis of Variational Inequalities*, AIAA SciTech 2019 San Diego.

○ *Pricing of boundary-linked assets by stochastic boundary value problems* ,Joint Mathematics Meetings, Atlanta, Georgia, January 4-7, 2017.

○ *On Adaptive algorithm for Stochastic Boundary Value Problems*, FINACT-IRAN Workshop on Financial and Actuarial Mathematics, August 19-21, 2014 ,IPM, Iran.

○ *An Adaptive Multiple Shooting Method for Stochastic Boundary Value Problems*, Fifth Workshop on Stochastic Processes, University of Tehran, November 26, 2009, Tehran, Iran.

○ *Numerical Solution of Stochastic Differential Equations*, First Seminar on Financial Mathematics, Spring 2008, IASBS, Zanjan Iran.

Experience

Summer 2019	**IMA-Math-to-Industry Bootcamp**, *University of Minnesota*.

- Administered project for the modeling of holidays effect on LIBOR interest rate-using regression
- Collaborated on project of studying the abnormality in calibrating quantum computers (Dwave company)
- Data monitoring and visualization of data with Python

2016-present	**Teaching**, *Mississippi State University*.

- Business Calculus
- Mathematical Foundation of Finite Element Method

2011 to 2016	**Teaching**, *University of Applied Science and Technology, Tehran, Iran*.

- Undergraduate Mathematics (e.g. Calculus I, II)
- Undergraduate Finance (e.g. Financial Management, Financial Mathematics)
- Numerical Analysis I,II

2010	**Teaching Assistant**, *Dep. of Applied Math.,Institute for Advanced Studies in Basic Sciences (IASBS)*, Zanjan, Iran.

- TA for Advanced Stochastic Process
- TA for Advanced Numerical Analysis

Professional Services

2016-present	**Services**.

- President of Iranian Student Association (IRSA) In MSU(2018-present)
- Treasurer of Iranian Student Association (IRSA) In MSU (2017-2018)
- Vice President of Iranian Student Association (IRSA) In MSU (2016-2017)
  Administrated the biggest international event in Mississippi State University (Persian new year Festival)

Award.

Presidential Graduate Initiative Fellowship, Mississippi State University. August 2016.

Skills

Scientific Computing.

- Analysis of continuous, and discontinuous Galerkin method
- Analysis of Discontinuous Petrov Galerkin method
- Numerical analysis of variational equations, PDE-constrained optimization
- Collocation meshfree methods
- Numerical solution of the stochastic differential equation
- Deep learning specialization

Programs.

- MATLAB, Mathematica, PETSc, MFEM, Firedrake, Git, dealii, UNIX/LINX,

Computer Languages.

- C/C++, R, Python, Python, MPI, OOP

Certificates.

- Deep learning specialization in Andrew Ng course on Coursera

Languages.

- English, Persian, Turkish

Relevant Courses

Ph.D.
- Theory of Differential Equation (I,II)(A)
- Functional Analysis (I,II)(A)
- Numerical Linear Algebra (A)
- Numerical Partial Differential Equations (A)
- Continuum Mechanics (A)

Research Interests

Computational
- Scientific Computing
- Computational Methods for PDEs and PIDEs
- Computational Methods for Nonlinear Free Boundary Value Problems
- Semi-Smooth Methods
- Machine Learning, Deep Learning, and Reinforcement Learning

Theoretical
- Discontinuous Galerkin Method
- Deterministic and Stochastic Differential Equations
- PDE-constrained Optimization and Variational Inequalities
- Error and Stability Analysis
- Stochastic Analysis
- Mathematics in Machine Learning
- Mean-filed Games

Citizenship

- Green card holder

References

- Prof. Robert Lipton, (PI), Email: lipton@lsu.edu
- Prof. Mohsen Razzahghi, (Ph.D. Advisor), Email: razzaghi@math.msstate.edu
- Dr. Shantia Yarahmadian, Email: syarahmadian@math.msstate.edu
- Dr. Matthew McBride, Email: mmcbride@math.msstate.edu