

Harshal D. Kaushik

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Industrial Engineering and Management, Oklahoma State University, Stillwater, OK 74078.

EDUCATION

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|---|----------------------|
| Ph.D. in Industrial Engineering (Expected in Summer 2021) <i>School of Industrial Engineering and Management</i> <i>Oklahoma State University.</i> | Spring 2017– present |
| M.Tech. in Applied Mechanics <i>Indian Institute of Technology (IIT), Madras, India.</i> | 2013 – 2015 |
| B.E. in Mechanical Engineering <i>University of Pune, India</i> | 2008 – 2012 |

RESEARCH INTERESTS

- Large-scale optimization, Distributed optimization.
- Computational game theory, Variational inequalities.
- Applications: Image deblurring, Nash Cournot games, Power systems, Machine learning.

PUBLICATIONS

- H. D. Kaushik and F. Yousefian, “A Method with Convergence Rates for Optimization Problems with Variational Inequality Constraints”, SIAM Journal on Optimization (under review), August 2020, preprint: arXiv:2007.15845v1 [math.OC]
- H. D. Kaushik and F. Yousefian, “An Incremental Gradient Method for Distributed Optimization with Variational Inequality Constraints”, manuscript under preparation for the Journal of Optimization Theory and Applications.
- P. Ramu and H. Kaushik, “A Log-third Order Polynomial Normal Transformation Approach for High-reliability Estimation with Scarce Samples”, International Journal of Reliability and Safety 14 (1), 14–38.
- H. Kaushik and F. Yousefian, “A Randomized Block Coordinate Iterative Regularized Subgradient Method for High-dimensional Ill-posed Convex Optimization”, 2019 American Control Conference (ACC), IEEE, Philadelphia, PA, USA, 2019, 3420–3425.
- H. D. Kaushik and F. Yousefian, “An Incremental Gradient Method for Large-scale Distributed Nonlinearly Constrained Optimization”, 2021 American Control Conference (ACC), under review, Preprint: arXiv.org/abs/2006.07956v3 [math.OC]
- H. Kaushik, R. Mohan, and K. A. Prakash, “Utilization of Wind Shear for Powering Unmanned Aerial Vehicles in Surveillance application: A numerical Optimization Study”, Energy Procedia 90, 349–359.

RESEARCH EXPERIENCE

- **Graduate Research Assistant**
School of Industrial Engineering and Management Spring 2017– present
 - **Large-scale optimization:** Extended first-order schemes by leveraging iterative regularization and randomized block selection techniques with the overall goal of developing the convergence rate statements.
 - **Optimization with the variational inequality constraints:** Proposed a unifying formulation for constrained convex optimization by leveraging the concept of variational inequalities. Developed iterative regularized block-coordinate gradient schemes with the goal of obtaining the convergence rate statements.

- **Distributed optimization with variational inequality constraints:** Proposed incremental gradient methods to circumvent a computationally costly projection operator and to address nonlinear constraints in a finite sum distributed optimization problems. Analyzed the schemes to obtain the rate of convergence.
- **Summer Research Intern**
Schneider Summer 2019
 Reformulated the mixed-integer nonconvex programming problem into a bilevel optimization framework. Built a hybrid algorithm by blending docplex solver with an iterative gradient descent scheme. Effectively employed SQL and Python libraries: pandas, NumPy. Collaborated across different teams, gathered data in a short time, and elucidated the presumable gain.
- **Project Associate**
Indian Institute of Technology (IIT), Madras 2015 – 2016
 - **Failure probability estimation:** Reliability estimation of a complex system with a scarce dataset. Tools used: importance sampling, surrogate modeling, and the approximation of the tails of cumulative distribution function in a probit space.
 - **Trajectory optimization and stability analysis:** Incorporated a six degrees of freedom flight dynamics model in the problem formulation. Optimized for improving the surveillance and stability.

PRESENTATIONS

- “A First Order Method for High-dimensional Ill-posed Optimization Problems”, INFORMS Annual Meeting 2018, Phoenix, AZ. (Nov. 5th, 2018).
- “A Randomized Block Coordinate Iterative Regularized Subgradient Method for High-dimensional Ill-Posed Convex Optimization”, 2019 American Control Conference, Philadelphia, PA. (Jul. 11th, 2019).
- “First-Order Methods for Optimization over the Solution Set of Variational Inequality Problems”, INFORMS Annual Meeting 2019, Seattle, WA. (Oct. 22nd, 2019).
- “An Incremental Gradient Method for Large-scale Distributed Nonlinearly Constrained Optimization”, INFORMS Online 2020 (Nov. 13th, 2020).

TEACHING EXPERIENCE

- TA for Engineering and Economic Analysis (IEM 3503): Spring 2019, 2020. Fall 2017, 2018 .
- TA for Production Planning and Control System (IEM 4613): Fall 2018, 2019.
- TA for Introduction to Optimization (IEM 5013): Fall 2019.

SCHOLARSHIPS AND AWARDS

- *Roy and Virginia Dorrough* Distinguished Graduate Fellowship 2020 – 2021
- Institute of Operations Research and Management Science (INFORMS): Optimization Society, Simulation Society. 2018– present
- Member of an honor society for Industrial and Systems Engineering students: Alpha Pi Mu. 2018– present
- Member of Stillwater Toastmasters International Club (District 16, Area O2). 2019– present
- M.Tech scholarship from the Ministry of Human Resource & Development, Government of India. 2013 – 2015

COURSEWORK

- **Optimization and Operations Research:** Stochastic Processes (IEM 5133), Network Optimization (IEM 5063), Convex Optimization (IEM 6990), Integer and Combinatorial Optimization (IEM 6053), Nonlinear Optimization (IEM 6043), Optimization Under Uncertainty (IEM 6063).

PROGRAMMING SKILLS

- **Programming and Simulation software:** Python, MATLAB, CPLEX, Gurobi, Catia V5, Autocad, Ansys Fluent, GPOPS, preliminary understanding of C and R.