Alp Dener

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Skills

Optimization: PDE-constrained Problems, Gradient-based Algorithms, Sensitivity Analysis, MDO Architectures
Scientific Computing: High Performance Computing, Parallel Programming, Numerical Solution of PDEs
Programming Languages: Python, ANSI C, C99, Fortran 77/90/95, MATLAB

Education

Rensselaer Polytechnic Institute   December 2017
Aeronautical Engineering, Ph.D.
University of Maryland, Baltimore County   May 2012
Mechanical Engineering, B.S.

Work Experience

Postdoctoral Appointee – Argonne National Laboratory   Feb 2018–Present
Mathematics and Computer Science Division   Supervisor: Todd S. Munson
  - Principal developer on Toolkit for Advanced Optimization (TAO) and contributor to PETSc
  - Research large-scale optimization algorithms with efficient treatment of nonlinear constraints
  - Promote TAO, expand its user base, and provide software support for external researchers

Graduate Research Assistant – Rensselaer Polytechnic Institute   Feb 2013–Dec 2017
Optimal Design Lab   Supervisor: Jason E. Hicken
  - Investigate PDE-constrained multi-disciplinary design optimization problems
  - Research gradient-based, reduced-space, matrix-free optimization algorithms
  - Develop a parallel-agnostic optimization library tailored for large-scale engineering systems

Undergraduate Research Assistant – University of Maryland, Baltimore County   Oct 2010–May 2011
Joint Center for Earth Systems Technology   Supervisor: Gergely Dolgos
  - Construction of an optical aerosol measurement instrument
  - Design and manufacture of high-precision optical component mounts
  - Propose instrument mounting solutions for the NASA GSFC science fleet aircraft

Honors & Awards

  - AIAA Student Paper Competition - 1st Place   2018
    - Category: Multidisciplinary Analysis and Optimization

Publications

Journal Articles

Dener, Alp, Adam Denchfield, and Todd S. Munson (2020). "The TAO Nonlinear Conjugate Gradient and Quasi-Newton Laboratory (submitted)". In: *Mathematical Programming Computation, Springer*.

Hicken, Jason E., Penfgei Meng, and Alp Dener (2020). "Error-tolerant Multisecant Method for Nonlinearly Constrained Optimization (submitted)". In: *Optimization and Engineering, Springer*.

Dener, Alp and Jason E. Hicken (2017). "Matrix-free Algorithm for the Optimization of Multidisciplinary Systems". In: *Structural and Multidisciplinary Optimization, Springer*. DOI: 10.1007/s00158-017-1734-0.

Hicken, Jason E. and Alp Dener (2015). "A Flexible Iterative Solver for Nonconvex, Equality-constrained Quadratic Subproblems". In: *Journal on Scientific Computing, SIAM*. DOI: 10.1137/140994496.

Conference Proceedings

Dener, Alp, Adam Denchfield, and Todd S. Munson (June 2019). "Preconditioning nonlinear conjugate gradient with diagonalized quasi-Newton". In: *Proceedings for the Platform for Advanced Scientific Computing Conference*. Zurich, Switzerland. DOI: 10.1145/3324989.3325712.

Dener, Alp and Todd S. Munson (June 2019). "Accelerating Limited-Memory Quasi-Newton Convergence for Large-Scale Optimization". In: *International Conference on Computational Science*. Faro, Portugal. DOI: 10.1007/978-3-030-22744-9_39.

Dener, Alp, Jason E. Hicken, et al. (June 2018). "Enabling Modular Aerostructural Optimization: Individual Discipline Feasible without the Jacobians". In: *2018 Multidisciplinary Analysis and Optimization Conference, AIAA AVIATION Forum*. Atlanta, GA, USA. DOI: 10.2514/6.2018-3570.

Dener, Alp, Pengfei Meng, et al. (Jan. 2016). "Kona: A Parallel Optimization Library for Engineering-Design Problems". In: *57th AIAA/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference, AIAA SciTech Forum*. San Diego, CA, USA. DOI: 10.2514/6.2016-1422.

Dener, Alp, Gaetan K. W. Kenway, et al. (Jan. 2015). "Comparison of Inexact- and Quasi-Newton Algorithms for Aerodynamic Shape Optimization". In: *53rd AIAA Aerospace Sciences Meeting, AIAA SciTech Forum*. Kissimmee, FL, USA. DOI: 10.2514/6.2015-1945.

Dener, Alp and Jason E. Hicken (Jan. 2014). "Revisiting Individual Discipline Feasible with matrix-free Inexact-Newton-Krylov". In: *10th AIAA Multidisciplinary Design Optimization Conference, AIAA SciTech Forum*. National Harbor, MD, USA. DOI: 10.2514/6.2014-0110.

Doctoral Thesis

Dener, Alp (Dec. 2017). "A Modular Matrix-free Approach to Multidisciplinary Design Optimization". PhD thesis. Rensselaer Polytechnic Institute.