

DENIS RIDZAL

RICE UNIVERSITY, CAAM DEPT.
6100 MAIN ST - MS 134
HOUSTON, TX 77005 - 1892

PHONE: (713) 348 - 2617
EMAIL: dridzal@rice.edu
URL: www.caam.rice.edu/~dridzal

EDUCATION

- 2001–present: *Rice University, Department of Computational and Applied Mathematics (CAAM)*
Graduate Student, Ph. D. Program. Advisor: Matthias Heinkenschloss.
Expected date of graduation: May 2006.
- 1997–2001: *Indiana University–Purdue University at Indianapolis (IUPUI)*
Bachelor of Science with Highest Distinction (GPA 3.99/4.0).
Major: Mathematics. Minor: Computer Science.
- 1996–1997: *Friedrich–Alexander Universität Erlangen–Nürnberg, Germany*
Major: Mathematics, Bachelor of Science Program.
- 1993–1996: *Leibniz–Gymnasium High School, Altdorf, Germany*

RESEARCH

Numerical solution of large–scale optimization problems, with focus on nonlinear optimization problems in which the constraints involve the solution of partial differential equations (PDEs). Applications include optimal control, optimal design, parameter estimation, and inverse problems.

Recent work: (1) Sequential quadratic programming (SQP) algorithms with inexact (e.g. iterative) linear system solves. (2) Domain decomposition methods for KKT systems arising in advection-dominated elliptic optimal control problems. (3) Development of matrix-free SQP software that supports problem dependent iterative linear system solvers, such as multigrid or domain decomposition methods.

INTERNSHIPS

- May–Aug. 2005: *Sandia National Laboratories, Albuquerque, NM, Optimization and Uncertainty Estimation Group*
Parallel implementation of a matrix-free SQP framework for the solution of large-scale nonlinear optimization problems. Integration of iterative linear system solvers and domain decomposition KKT preconditioners (Trilinos Solver Framework, Sandia Labs). Target applications: optimal control of a nonlinear reaction–diffusion model for water networks, nonlinear source inversion, and optimal control of a three-dimensional Navier–Stokes airflow model.
- May–Aug. 2004: *Sandia National Laboratories, Albuquerque, NM, Optimization and Uncertainty Estimation Group*
Work on a source inversion problem with the goal to identify locations and intensities of hazardous biochemical releases, from measurements of their concentrations at a limited number of sensor locations. Development of a Matlab toolbox for the the solution of the underlying advection-dominated linear-quadratic elliptic optimal control problems.

ACADEMIC AWARDS AND SCHOLARSHIPS

- 2001–2005: Presidential Fellowship, Rice University.
- 2001: Chancellor’s Scholar, IUPUI Purdue School of Science.
- 2000: Chair’s Special Recognition Award, IUPUI Dept. of Mathematics, for achievements at the 60th annual W. L. Putnam Mathematical Competition.
- 1998–1999: Anna K. Suter Memorial Scholarship, IUPUI Dept. of Mathematics.
- 1997–1998: Member of the “Studienstiftung des Deutschen Volkes”, German National Academic Foundation.

TEACHING EXPERIENCE

- Jan.–May 2005: *CAAM Department, Rice University*
Instructor for the course CAAM 335, Matrix Analysis. Applied matrix analysis and linear algebra, complex variables and applications.
- Jan.–May 2003: *CAAM Department, Rice University*
Teaching assistant for the course CAAM 336, Differential Equations in Science and Engineering. Numerical methods for ordinary and partial differential equations.
- Jan.–May 2001: *Department of Mathematics, IUPUI*
Instructor for a course on general problem solving, for advanced high school students participating in mathematical competitions (work in collaboration with Pavel Bleher).

PUBLICATIONS

- Roscoe A. Bartlett, Matthias Heinkenschloss, Denis Ridzal, and Bart G. van Bloemen Waanders. Domain decomposition methods for advection dominated linear-quadratic elliptic optimal control problems. Submitted for publication, 2005.
- Pavel Bleher and Denis Ridzal. $SU(1, 1)$ random polynomials. *J. Statist. Phys.*, 106(1-2):147–171, 2002.
- Raymond C. Y. Chin and Denis Ridzal. Generating orthogonal polynomials for exponential weights on a finite interval. In *Special functions (Hong Kong, 1999)*, pages 42–56. World Sci. Publishing, River Edge, NJ, 2000.

PRESENTATIONS

- SIAM Annual Meeting, New Orleans, LA, July 2005: *Use of Iterative Linear Solvers in a Lagrange-Newton SQP Algorithm for Large-Scale Nonlinear Optimization.*
- SIAM Conference on Computational Science and Engineering, Orlando, FL, Feb. 2005: *A Sequential Quadratic Programming Framework for Large-Scale PDE-Constrained Optimization.*
- VIGRE Seminar on Simulation-Driven Optimization, CAAM Dept., Rice University, Houston, TX, Feb. 2005: *A Domain Decomposition Preconditioner for Optimal Control Problems Governed by Advection-Diffusion PDEs.*
- CAAM Lunch Talk, CAAM Dept., Rice University, Houston, TX, Oct. 2004 (with Fernando Guevara Vasquez): *The Amazing World of Level Sets.*
- Annual Symposium, Student Internship Programs, Sandia National Labs, Albuquerque, NM, Aug. 2004: *Parallel Solution of Quadratic Optimal Control Problems Governed by Elliptic PDEs with Piecewise Linear Coefficients.*
- ExxonMobil Upstream Research Company, Houston, TX, Jan. 2004: *A General Software Framework for Trust-Region SQP Algorithms.*

COMPUTER SKILLS

Programming: C/C++, Perl, Fortran 77, Matlab.
Libraries: BLAS/LAPACK, MPI, Trilinos Solver Framework: Epetra, AztecOO, IFPACK.
Meshing/Graphics: Cubit, Tetgen, Triangle; VTK, ParaView, OpenDX.

LANGUAGES English, German, Serbo-Croatian.

CITIZENSHIP USA