Curriculum Vitae

Dacian N. Daescu

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Education

The University of Iowa, Ph.D. Applied Mathematical and Computational Sciences (2001)

Ph.D. Thesis: *Theoretical and Practical Aspects of Data Assimilation for Air Pollution Models*

Dissertation Advisor: Prof. Gregory R. Carmichael (gcarmich@icaen.uiowa.edu)

The University of Iowa, M.S. Computer Science (2001)
University of Craiova Romania, M.S. Mathematics (1995)
University of Craiova Romania, B.S. Mathematics (1994)

Appointments

Assistant Professor, Dept. of Mathematics and Statistics, Portland State University, Sept. 2003 -
Postdoctoral Associate, IMA University of Minnesota, Sept. 2001- Aug. 2003
Teaching and Research Assistant, University of Iowa 1996-2001

Research Interests

Numerical Analysis
Large-scale optimization techniques
Data assimilation, inverse modelling and uncertainty analysis
Experimental design for optimal prediction

Research Experience and Awards

- Who's Who in America: 2004, 2005
- University of Minnesota Supercomputing Institute for Digital Simulation and Advanced Computation Research Scholarship (July 2002 - June 2003)
- USRA/NASA Goddard Space Flight Center: Graduate Student Summer Program (June-August 2000)
- Research Assistantship, Center for Global and Regional Environmental Research, The University of Iowa (2000, 2001)
- Summer Merit Fellowships, The University of Iowa (1997, 1998, 1999)
- TEMPUS Scholarship, University of Complutense Madrid Spain, (Oct.1993 - June 1994)

Grants

- PI: *Development of a new methodology for adaptive observations in the framework of four-dimensional variational data assimilation*
  NASA - Modeling, Analysis and Prediction Research Announcement NN-H-04-Z-YS-008-N, 2005-2008.
- Co-PI: *CMG Collaborative Research: Ensemble data assimilation based on control theory*
  NSF Program Mathematical Geosciences, 2003-2006, Award # ATM-0327818
- Co-Investigator *"ITR : Development of a General Computational Framework for the Optimal Integration of Atmospheric Chemical Transport Models and Measurements Using Adjoints"*.
  NSF Program 1687 ITR Medium (Group) Grants, Award # 0205198, 2002-2007.

Collaborators: Ionel M. Navon (Florida State University), Adrian Sandu (Virginia Tech), Gregory R. Carmichael (University of Iowa), Milija Zupanski (Colorado State University)

Graduate studies advisor: Prof. Gregory R. Carmichael, University of Iowa

Postdoctoral advisor: Prof. Fadil Santosa, University of Minnesota

Graduate Students Advising: Humberto Godinez (Ph.D.), Roderick Oleg (Ph.D.)

Journal Papers

1. Adjoint sensitivity analysis of regional air quality models, *by A. Sandu, D.N. Daescu, G.R. Carmichael, and T. Chai*, *Journal of Computational Physics*, **204**, 222-252 (2005)

2. Adaptive observations in the context of 4D-Var data assimilation, *by D.N. Daescu and I.M. Navon. Meteorology and Atmospheric Physics*, 85, 205-226 (2004).

3. Direct and adjoint sensitivity analysis of chemical kinetics systems with KPP: II-Numerical validation and applications, *by D.N. Daescu, A. Sandu, and G.R. Carmichael. Atmospheric Environment* 37, 5097-5114 (2003)

4. Direct and adjoint sensitivity analysis of chemical kinetics systems with KPP: I-Theory and software tools, *by A. Sandu, D.N. Daescu, and G.R. Carmichael. Atmospheric Environment* 37, 5083-5096 (2003)

5. An analysis of a hybrid optimization method for variational data assimilation, *by D.N. Daescu and I.M. Navon. International Journal of Computational Fluid Dynamics*, Vol. 17, No. 4, pp. 299-306 (2003).

6. An adjoint sensitivity method for the adaptive location of the observations in air quality modeling, *by D.N. Daescu and G.R. Carmichael. Journal of the Atmospheric Sciences*, Vol. **60**, No. 2, 434-450 (2003).

7. A communication library for the parallelization of air quality models on structured grids, *by P. Miehe, A. Sandu, G.R. Carmichael, Y. Tang, and D.N. Daescu. Atmospheric Environment* **36** (24) pp. 3917-3930 (2002)

8. Second order information in data assimilation, *by F.-X. Le Dimet, I.M. Navon and D.N. Daescu. Monthly Weather Review*, Vol. **130**, No. 3 , 629-648 (2002)

9. Adjoint implementation of Rosenbrock methods applied to variational data assimilation problems, *by D.N. Daescu, G.R. Carmichael, and A. Sandu. Journal of Computational Physics*, **165** (2), 496-510 (2000)

Conference Presentations and Papers in Proceedings

• The impact of background error on incomplete observations for 4D-Var data assimilation with the FSU GSM, by I.M. Navon, D.N. Daescu, and Z. Liu. Lecture Notes in Computer Science, Vol. 3515/2005, p. 837-844. 5th International Conference on Computational Science, Atlanta, GA, May 22-25, 2005 Proceedings, Part II.

• Time dependent sensitivity analysis and parameter estimation for multiscale systems, by D.N. Daescu and A. Sandu. 2004 SIAM Annual Meeting, July 12-16, Portland, Oregon.

• Adjoint sensitivity analysis and data assimilation for atmospheric chemical models, by A. Sandu, G.R. Carmichael, D.N. Daescu, and T. Chai. 2004 SIAM Annual Meeting, July 12-16, Portland, Oregon.

• New adjoint-based methods for targeted observations in atmospheric modeling, *by D.N. Daescu and I.M. Navon. SIAM Conference on Computational Science and Engineering, February 10-13, 2003, San Diego, CA.*

• An analysis of the enriched optimization methods for variational data assimilation, *by I.M. Navon and D.N. Daescu. The sixteenth triennial conference of the International Federation of Operational Research Societies (IFORS), Edinburgh, Scotland, July 8-12, 2002.*

• Adaptive observations in the context of 4D-Var data assimilation, *by I.M. Navon and D.N. Daescu. EGS XXVII General Essembly, Nice, France, April 22-26, 2002.*

• Adjoint modeling for chemical reactions mechanisms: discrete versus continuous, by *D.N. Daescu and A. Sandu. 5th Workshop on Adjoint Applications in Dynamic Meteorology, Pennsylvania, April 21-26, 2002.*

• Automatic generation of efficient adjoints for chemical kinetic systems, by *A. Sandu and D.N. Daescu. 5th Workshop on Adjoint Applications in Dynamic Meteorology, Pennsylvania, April 21-26, 2002.*

• Adjoint Sensitivity Analysis Applied to the Adaptive Location of the Observations, *by D.N. Daescu and G.R. Carmichael. Proceedings of 2nd International Conference on Air Pollution Modeling and Simulation, April 9-13, 2001 Paris, France.* Bruno Sportisse (Ed.), Springer 2002, p. 476-488.

• Adjoint data assimilation for aerosol dynamic equations, by A. Sandu, D.N. Daescu and G.R. Carmichael. *Proceedings of 2nd International Conference on Air Pollution Modeling and Simulation, April 9-13, 2001 Paris, France.* Bruno Sportisse (Ed.), Springer 2002, p. 319-331.

• Efficient Location of the Observations in Data Assimilation for Air Pollution Models, *by D.N. Daescu and G.R. Carmichael. First SIAM conference on Computational Science and Engineering, September 21-24, 2000 Washington, DC*

• Coupled Transport-Chemistry Computations in 4D-Var Data Assimilation for Air Pollution Models, *by D.N. Daescu and G.R. Carmichael. IMA Workshop, Atmospheric Modeling, March 15-19, 2000 Minneapolis.* IMA Volume 130, Atmospheric Modeling, p. 153-164, Springer-Verlag 2002.

• Adjoint Implementation of Rosenbrock Methods Applied to Variational Data Assimilation in Air Pollution Models, *by D.N. Daescu, G.R. Carmichael and A.Sandu. Milenium NATO/CCMS International Technical Meeting on Air Pollution Modeling and Its Applications, May 15-19, 2000 Colorado, p. 346-354.*

• Computational Challenges of Modeling Interactions Between Aerosol and Gas Phase Processes in Large Scale Air Pollution Models, *with G.R. Carmichael et al.. Large-Scale Computations in Air Pollution Modeling, Kluwer Academic Publishers 1999, p. 99-136.*