

REBECCA ANNE SEGAL

Department of Mathematics
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EDUCATION:

Ph. D. in Applied Mathematics August 2001
(Concentration in Computational Mathematics)
North Carolina State University, Raleigh, NC
"Patterns of air flow and particle deposition in the diseased human lung"
Advisor Prof. Michael Shearer.

BA in Mathematics May 1994
Bryn Mawr College, Bryn Mawr, PA

CURRENT POSTION:

Assistant Professor August 2006-present
Department of Mathematics
Virginia Commonwealth University, Richmond, VA

PREVIOUS POSITIONS:

Temporary Teaching Fellow September 2005-August 2006
Mathematics Department
University of Bristol, Bristol, UK

Part-time Lecturer January 2005-August 2005
Mathematics Department
University of Bristol, Bristol, UK

Postdoctoral Fellow July 2001-December 2004
CIIT Centers for Health Research
Research Triangle Park, NC

HONORS/AWARDS:

- Selected Participant CTE Tablet Program 2008-2009
- Travel funds from AWM for \$1200 to attend SMB meeting in Toronto, 2008
- Selected Participant CTE Prodcasting Program 2007-2008
- Fellow, Center for the Study of Biological Complexity
- Learning and Teaching Award of £11,000 from University of Bristol Education Committee, 2005
- Funded postdoctoral presenter at the AWM workshop concurrent with Annual SIAM meeting, Philadelphia, 2002
- Funded graduate student presenter at the AWM workshop concurrent with Annual SIAM meeting, Atlanta, 1999
- Winner of a Risk Assessment Award for SOT Poster Presentation, Annual SOT Conference, New Orleans, 1999
- Student Paper Award at 2nd National SIAM Student Conference, Tallahassee, FL, 1998
- Performance bonus: simulations of particle deposition fractions in lung, US EPA, 1998

RESEARCH:

Publications

1. NB Menke, JW Cain, DM Chan, RA Segal, TM Witten, DG Bonchev, RF Diegelmann, KR Ward. An Ordinary Differential Equation Model of Acute Wound Healing. *Accepted with revisions February, 2009 to Wound Repair and Regeneration* (IF=2.445)
2. GJM Garcia, JD Schroeter, RA Segal, J Stanek, GL Foureman, JS Kimbell. Dosimetry of nasal uptake of soluble and reactive gases: a first study of inter-human variability. *Accepted July 2008 in Inhalation Toxicology, Publish date June 2009* (IF=1.831)
3. RA Segal, GM Kepler, JS Kimbell. Effects of Differences in Nasal Anatomy on Airflow Distribution: A Comparison of Four Individuals At Rest. *Annals of Biomedical Engineering*. 2008(36): 1870-1882. (IF = 2.346)
4. J.S. Kimbell, R.A. Segal, B Asgharian, B.A. Wong, J.D. Schroeter, J.P Southall, C.J. Dickens, G Brace, F.J. Miller. "Characterization of Deposition from Current Nasal Spray Devices Using a Computational Fluid Dynamics Model of the Human Nasal Passages." *J. of Aerosol Medicine*. 2007(20): 59-74. (IF=1.945)
5. D. Wexler, R.A. Segal, J.S. Kimbell. "Aerodynamic effects of inferior turbinate reduction – Computational fluid dynamics simulation" *Archives of Otolaryngology – Head & Neck Surgery*. 2005(131): 1102-1107. (IF=1.734)
6. R.A. Segal, J.M. Sheppard, J.S. Kimbell. "Using Fieldview to Locate the Nasal Valve in a CFD Model of the Human Nasal Passages" *Fluent News* 2003 (12):15.
7. R.A. Segal, T.B. Martonen, C.S. Kim, M. Shearer. "Computer Simulations of Particle Deposition in the Lungs of Chronic Obstructive Pulmonary Disease Patients" *Inhalation Toxicology* 2002(14):705-720. (IF=2.167)
8. Martonen, T. B., Musante, C. J., Segal, R. A., Schroeter, J. D., Hwang, D., Dolovich, M. A., Burton, R., Spencer, R. M., and Fleming, J. S. "Lung models: strengths and limitations" *Respiratory Care* 2000(45):712-736.
9. X. Guan, R.A. Segal, M. Shearer, T.B. Martonen. "Mathematical Model of Airflow in the Lungs of Children II: Effects of Ventilatory Parameters" *Journal of Theoretical Medicine*. 2000(3):51-62.
10. R.A. Segal, T.B. Martonen, C.S. Kim. "Comparison of Computer Simulations and Human Data for Particle Deposition in Healthy Subjects" *Journal of Air and Waste Management Association* 2000(50):1262-1268.
11. R.A. Segal, X. Guan, M. Shearer, T.B. Martonen. "Mathematical Model of Airflow in the Lungs of Children I: Effects of Tumor Sizes and Locations" *Journal of Theoretical Medicine*. 2000(2):199-213.

Presentations

1. The Dynamics of a Healing Wound, Complex Biological Systems Group Theme Days at University of Pittsburgh, May 2009
2. Invited Guest Lecturer at Old Dominion University, Norfolk. Course in math modeling for health science majors, 3 hour lecture. April 2009.
3. In Silico Approach to the Analysis of Acute Wound Healing (poster with Angela Reynolds) at the Math Bio Institute Wound Healing Workshop, Columbus, March 2009
4. Overview of Current Trends in Biomath, Inaugural Biomath Seminar Series talk, VCU, September 2008
5. Nasal Airflow Distribution in Human Subjects SIAM Life Sciences, Montreal, August 2008
6. Special Session on Mathematical Modeling in Wound Healing at 2008 Annual Meeting of the Society of Mathematical Biology, Toronto, July 2008

7. Nasal Geometry Impact on Health of Individuals. Differential Equations Seminar, University of Virginia, Charlottesville, March 11, 2008
8. Mathematical Model for Wound Healing. Annual Southeast-Atlantic Region Conference on Differential Equations, Murray State, Murray, KY October 2007
9. Inter-individual Differences in Nasal Airflow Distribution. Frontiers in Applied Mathematics, Newark, May 14-16, 2007.
10. Airflow in the nasal passages – effect of boundary conditions. British Applied Mathematics Colloquium, Bristol, April 17-19, 2007.
11. Three-Dimensional Computer Modeling of the Human Nasal Passages. British Applied Mathematics Colloquium, Liverpool, April 4-7, 2005.
12. What Good is Your Nose? Bristol Laboratory for Advanced Dynamics Engineering (BLADE) Seminar Series, Bristol, October 12, 2004.
13. Correlation of Nasal Surface-Area-to-Volume Ratio with Predicted Inhaled Gas Uptake Efficiency in Humans. Society of Toxicology Annual Meeting, Baltimore, March 21 - 25, 2004.
14. Three-Dimensional Computer Modeling of the Human Upper Respiratory Tract. 10th Congress of the International Rhinologic Society and 22nd International Symposium on Infection and Allergy of the Nose Seoul, October 23-26, 2003.
15. Effects of Differences in Nasal Anatomy on Airflow Distribution: A Comparison of Three Individuals. Society of Toxicology Annual Meeting, Salt Lake City, March 9-13, 2003.
16. Effects of boundary conditions on particle deposition predictions in human nasal passages. Fourth World Congress Biomechanics, Calgary, August 4-9, 2002.
17. Effects of boundary conditions on particle deposition predictions in human nasal passages. Association of Women in Mathematics Workshop at the Annual Society of Industrial and Applied Mathematics Conference, Philadelphia, July 8-12, 2002.
18. Automating Three-Dimensional Mesh Reconstruction of Human Nasal Airways from Digitized MRI Scans. FIDAP 2002 Users' Group Meeting, Evanston, June 18-19, 2002.
19. Mesh Construction of Human Nasal Airways from Medical Images for Use in Flow Simulations. Postdoctoral Seminar, CIIT Centers for Health Research, Research Triangle Park, NC, May 23, 2002.
20. Particle Trajectories in the Cancerous Lungs of Children PM 2000: Particulate Matter and Health. Charleston, Jan 24-28, 2000.
21. Comparison of Computer Simulations and Human Data for Particle Deposition in Healthy Subjects. PM 2000: Particulate Matter and Health, Charleston, Jan 24-28, 2000.
22. Particle Deposition in Airway Disease Models. Southeast Regional Mathematics in Industry Workshop, Raleigh, Oct 10-13, 1999.
23. Comparison of Particle Deposition in Healthy Subjects and COPD Patients Using Computer Simulations and Human Data. Third Colloquium on Particulate Air Pollution and Human Health, Durham, June 6-8, 1999.
24. Mathematical Model of Airflow in a Child's Lung. Association of Women in Mathematics Workshop at the Annual Society of Industrial and Applied Mathematics Conference, Atlanta, May 12-15, 1999.
25. Comparison of Computer Simulations and Human Data for Particle Deposition in Healthy and COPD Subjects. Annual Society of Toxicology Meeting, New Orleans, March 14-18, 1999.
26. Mathematical Model of Effects of Carcinomas on Airflow Patterns in the Lungs of

- Children. Annual Society of Toxicology Meeting, New Orleans, March 14-18, 1999.
27. Environmental Simulations with the Cray T90: Effects of Air Pollutants on Children's Lungs. 1997 Cray Fellows Research Day, North Carolina Supercomputing Center, May 20, 1998.
 28. Simulation of Airflow in a Child's Lung. Second National SIAM Student Conference, SIAM-SEAS Conference, Florida State University, Tallahassee, March 19-21, 1998. Featured Student Talk.
 29. Effects of Air Pollution in the Lung. Modeling Discussion Group, EPA, NC August 26, 1997.
 30. Environmental Simulations with the Cray T90: Effects of Air Pollutants on Children's Lungs. Cray Grant Program Review Day, North Carolina Supercomputing Center, May 3, 1997.
 31. Flow through a Multi-branching Airway. SIAM-SEAS Conference, NCSU, April 4-5, 1997.

TEACHING:

Courses taught

- MATH 141 – College Algebra with Modeling Applications (fall and spring semester)
- MATH 301 – Ordinary Differential Equations (fall and spring semester)
- MATH 307 – Multivariate Calculus (fall and spring semester)

New courses developed and taught

- MATH 582 – Computational Modeling in Mathematical Biology.
 - This is a new course developed as part of the new undergraduate/graduate track for math majors in mathematical biology. We explored a variety biological systems and developed mathematical models and then solved the models computationally.
- MATH 515 – Numerical Analysis I
- MATH 516 – Numerical Analysis II
 - Revamped this course sequence using Matlab.

CTE Podcasting Program

- Participant in first CTE podcasting program to explore uses of this new technology for educational purposes.

CTE Tablet Program

- Participant in the CTE tablet program to explore uses of this new technology for educational purposes.

Graduate Student Advising

- Thesis advisor: Kalimah Vereen “SIR model of Malaria with vaccine”, May 2008
- Currently advising two Masters students:
 - Cheri Doucette “Impact of major highway location on health of population” anticipated Fall 2009
 - Paul Solomonsky “Use of multipole method for CFD simulation in a complex geometry” anticipated Fall 2009
- Committee member:
 - Michael Tien, Ph.D. in Mechanical Engineering, anticipated 2010.
 - Erich Foster, Masters in Mathematics, anticipated 2009.

General Advising

- Assigned 7 undergraduate student advisees
- Wrote 7 recommendation letters for students.

SERVICE:

Profession

- Leadership symposium at SMB meeting
- Mentor at the AWM Joint Mathematics Meeting workshop, Washington, DC 2009
- Co-chair special session at Joint Mathematics Meeting, Washington, DC 2009
- Chair Session (Fluids 8) at British Applied Mathematics Colloquium, Bristol 2007

University

- UWE exchange program for math and stats majors – worked to set-up an exchange program with the mathematics department at University of West of England to strengthen VCU's connection with this international campus partner.
 - First student attending UWE Fall 2009
- Discovery Lecture Series – participated on panel for undecided majors.

College

- HAS Library committee
- Science Day – initiated and organized department participation in event for incoming freshmen during orientation week

Department

- Department Tea – established and administer department tea
- Biomath Seminar – established and administer bi-monthly seminar in Biomath
- Math 141 workshop – helped plan and lead sessions in the Math 141 workshop
- Advising – currently assigned 5 undergraduates to advise
 - mentored one graduate student thesis
- Library committee representative – inform colleagues about new services and technologies available from library
- Biomath – planning and implementation of new undergraduate biomath track, includes development of new course
 - discussed mission, goals, organization, design of new PhD track in biomath.
- SACS – reviewed course materials for 4 courses
- Women in Math – support Norma Ortiz in the initiation of student group
- Credential Committee (2006-2008) – choose undergraduate department award recipients