

# Curriculum Vitae of Arnold D. Kim

## Personal Data

Associate Professor  
School of Natural Sciences  
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## Education

- Ph.D.* 2000 *Applied Mathematics*  
University of Washington, Seattle, WA
- M.S.* 1998 *Applied Mathematics*  
University of Washington, Seattle, WA
- B.S.* 1995 *Engineering Science and Applied Mathematics*  
Northwestern University, Evanston, IL

## Research Interests

- Wave propagation in random media
- Light propagation in biological tissues
- Wireless communications in complex environments
- Modelocking optical fiber lasers
- Numerical analysis and scientific computing
- Asymptotic and perturbation methods
- Inverse problems

## Academic History

- Associate Professor* (July 2006 to present)  
School of Natural Sciences, University of California, Merced
- Assistant Professor* (July 2004 to June 2006)  
School of Natural Sciences, University of California, Merced

**Postdoctoral Fellow** (January 2002 - June 2004)  
Department of Mathematics, Stanford University

**Postdoctoral Fellow** (August 2001 - December 2001)  
Semester Program on Inverse Problems and Integral Geometry, Mathematical Sciences Research Institute

**Postdoctoral Fellow** (September, 2000 - July, 2001)  
Department of Mathematics, Stanford University

## Academic Awards

**National Science Foundation Mathematical Sciences Postdoctoral Fellowship**  
Department of Mathematics, Stanford University (August 2000 - July 2003).

**Departmental Award for Teaching and Service**  
Department of Applied Mathematics, University of Washington (November 1999).

**National Science Foundation VIGRE Research Associate**  
Department of Applied Mathematics, University of Washington (September 1999 - December 1999).

**Research Assistant**  
Department of Electrical Engineering, University of Washington (June 1996 - September 1999).

**Research Assistant**  
Minority Education Program, University of Washington (March 1996 - June 1996).

**Undergraduate Research Assistant**  
Department of Engineering Science and Applied Mathematics, Northwestern University (September 1994 - June 1995).

## Publications

### *Refereed Journal Publications*

1. P. González-Rodríguez and A. D. Kim, "Comparison of light scattering models for image reconstructions in tissues," (in preparation).
2. J. Clark, P. González-Rodríguez and A. D. Kim, "Using polarization to find a source in a turbid medium," (submitted for publication).
3. P. González-Rodríguez and A. D. Kim, "Reflectance optical tomography in epithelial tissues," *Inverse Problems* (in press).
4. A. D. Kim, P. Kyritsi, P. Blomgren and G. Papanicolaou, "Low probability of intercept and intersymbol interference in time reversal communications," *IEEE Journal of Oceanic Engineering* (in press).

5. S. M. Emami, J. Hansen, A. D. Kim, G. Papanicolaou, A. J. Paulraj, D. Cheung and C. Prettie, "Predicted time reversal performance in wireless communications using channel measurements," *IEEE Communications Letters* (to appear).
6. P. González-Rodríguez and A. D. Kim, "Light propagation in tissues with forward-peaked and large-angle scattering," *Applied Optics* **47**, 2599-2609 (2008).
7. P. González-Rodríguez and A. D. Kim, "Light propagation in two layer tissues with an irregular interface," *Journal of the Optical Society of America A* **25**, 64-73 (2007).
8. A. D. Kim and P. Tranquilli, "Numerical solution of a boundary value problem for the Fokker-Planck equation with variable coefficients," *Journal of Quantitative Spectroscopy and Radiative Transfer* **109**, 727-740 (2007).
9. P. González-Rodríguez, A. D. Kim and M. Moscoso, "Reconstructing a thin absorbing obstacle in a half space of tissue," *Journal of the Optical Society of America A* **24**, 3456-3466 (2007).
10. R. Winston, A. D. Kim and K. Mitchell, "Measuring radiance: a paradigm for coherence optics in six-dimensional phase space," *Journal of Modern Optics* **53**, 2419-2429 (2006).
11. A. D. Kim, C. Hayakawa and V. Venugopalan, "Estimating tissue optical properties using the Born approximation of the transport equation," *Optics Letters* **31** 1088-1090 (2006).
12. A. D. Kim and J. C. Schotland, "Self-consistent scattering theory for the radiative transport equation," *Journal of the Optical Society of America A* **23**, 596-602 (2006).
13. A. D. Kim and M. Moscoso, "Radiative transport theory for optical molecular imaging," *Inverse Problems* **22**, 23-42 (2006).
14. A. D. Kim and M. Moscoso, "Light transport in two-layer tissues," *Journal of Biomedical Optics* **10**(3), 034015 (2005).
15. A. D. Kim, "A boundary integral method to compute Green's functions for the radiative transport equation," *Waves in Random and Complex Media* **15**, 17-42 (2005).
16. C. Oestges, A. D. Kim, G. Papanicolaou and A. J. Paulraj, "Characterization of space-time focusing in time-reversed random fields," *IEEE Transactions on Antennas and Propagation* **53**, 283-293 (2005).
17. A. D. Kim, "Transport theory for light propagation in biological tissue," *Journal of the Optical Society of America A* **21**, 820-827 (2004).
18. A. D. Kim and M. Moscoso, "Beam propagation in sharply peaked forward scattering media," *Journal of the Optical Society of America A* **21**, 797-803 (2004).
19. A. D. Kim, "Light propagation in biological tissues containing an absorbing plate," *Applied Optics* **43**, 555-563 (2004).
20. A. D. Kim and M. Moscoso, "Backscattering of beams by forward-peaked scattering media," *Optics Letters* **29**, 74-76 (2004).
21. A. D. Kim and M. Moscoso, "Radiative transfer computations for optical beams," *Journal of Computational Physics* **185**, 50-60 (2003).

22. A. D. Kim and J. B. Keller, "Light propagation in biological tissue," *Journal of the Optical Society of America A* **20**, 92-98 (2003).
23. A. D. Kim and M. Moscoso, "Backscattering of circularly polarized pulses," *Optics Letters* **27**, 1589-1591 (2002).
24. A. D. Kim and M. Moscoso, "Chebyshev spectral methods for radiative transfer," *Society for Industrial and Applied Mathematics Journal of Scientific Computing* **23**, 2075-2095 (2002).
25. K. Spaulding, D. H. Yong, A. D. Kim and J. Nathan Kutz, "Nonlinear Dynamics of Mode-Locking Optical Fiber Ring Lasers," *Journal of the Optical Society of America B* **19**, 1045-1054 (2002).
26. A. D. Kim and M. Moscoso, "Influence of the refractive index on the depolarization of multiply scattered waves," *Physical Review E* **64**, 026612 (2001).
27. A. D. Kim, J. N. Kutz and D. J. Muraki, "Pulse-Train Uniformity in Optical Fiber Lasers Passively Mode-Locked by Nonlinear Polarization Rotation," *IEEE Journal of Quantum Electronics* **36**, 465-471 (2000).
28. A. D. Kim and A. Ishimaru, "Chebyshev spectral method for radiative transfer equations applied to electromagnetic wave propagation and scattering in a discrete random medium," *Journal of Computational Physics* **152**, 264-280 (1999).
29. A. D. Kim and A. Ishimaru, "Optical diffusion of continuous-wave, pulsed and density waves in scattering media and comparisons with radiative transfer," *Applied Optics* **37**, 5313-5319 (1998).
30. A. D. Kim, W. L. Kath and C. G. Goedde, "Stabilizing dark solitons by using periodic phase-sensitive amplification," *Optics Letters* **21**, 465-467 (1996).

### ***Refereed Conference Publications***

1. A. D. Kim, "Transport theory for light propagation in random media," Proceedings of The International Society for Optical Engineering (SPIE), **5529**, 79-86 (2004).
2. A. D. Kim, "Transport theory for light propagation in tissues," Proceedings of The International Society for Optical Engineering (SPIE) **5319**, 146-154 (2004).
3. A. D. Kim and J. B. Keller, "Light Propagation in Biological Tissue," Proceedings of The International Society for Optical Engineering (SPIE) **4961**, 122-129 (2003).
4. A. D. Kim and M. Moscoso, "Backscattering of Circularly Polarized Pulses," Proceedings of The International Society for Optical Engineering (SPIE) **4961**, 130-136 (2003).
5. A. D. Kim, J. B. Keller and M. Moscoso, "Beam Propagation in Multiple Scattering Media," Proceedings of The International Society for Optical Engineering (SPIE) **4976**, 98-106 (2003).
6. K. Spaulding, D. H. Yong, A. D. Kim and J. N. Kutz, "Pulse train uniformity and dynamics in optical fiber lasers," Proceedings of the International Society for Optical Engineering (SPIE) **4271**, 202-212 (2001).

7. A. D. Kim, S. Jaruwatanadilok, A. Ishimaru, and Y. Kuga, "Polarized light propagation and scattering in random media," *Proceedings of the International Society for Optical Engineering (SPIE)* **4257**, 90-100 (2001).
8. A. D. Kim and A. Ishimaru, "Optical Diffusion of Focused Beam Wave Pulses in Discrete Random Media," *Proceedings of the International Society for Optical Engineering (SPIE)* **3914**, 423-434 (2000).
9. A. D. Kim, A. Ishimaru, and Y. Kuga, "Polarimetric Pulse Propagation Through Discrete Random Media," *Proceedings of the International Society for Optical Engineering (SPIE)* **3609**, 101-110 (1999).
10. A. D. Kim and A. Ishimaru, "Optical and Millimeter Wave Pulse Propagation Through Fog and Rain Layers," *IGARSS '98 Sensing and Managing the Environment, IEEE International Geoscience and Remote Sensing Symposium Proceedings*, IEEE Press, New York, NY, vol. 1, 33-35 (1998).

### ***Other Publications***

1. Review of *Fundamentals of Electromagnetism: Vacuum Electrodynamics, Media and Relativity* (A. López Dávalos and D. Zanette), A. D. Kim and D. Bale, *SIAM Review* **43**, 202 (2001).
2. Ph.D. Thesis, *Optical Pulse Propagation, Diffusion and Depolarization in Discrete Random Media*, University of Washington, (2000).
3. Technical Report, "Mathematical Foundations of Wave Scattering from a Discrete Scatterer," 99-01, Department of Applied Mathematics, University of Washington (1999).
4. Technical Report, "The Diffusion Limit of the One-Dimensional, Space-Time Radiative Transfer Equation," 99-07, Department of Applied Mathematics, University of Washington (1999).

### **Presentations**

#### ***Invited Talks***

1. Applied Math Seminar, Stanford University, Stanford, CA, November 2007.
2. Applied Inverse Problems, University of British Columbia, Vancouver, B.C., June 2007.
3. Summer School on Inverse Problems in Radiative Transfer, University of Washington, Seattle, WA, June 2007.
4. American Mathematical Society Spring Western Sectional Meeting Special Session on Inverse Problems for Wave Propagation, Tuscon, AZ, April 2007.
5. Applied Math Seminar, University of Washington, Seattle, WA, October 2006.
6. Inverse Problems Seminar, University of Washington, Seattle, WA, October 2006.
7. International Diffuse Reflectance Spectroscopy Conference, Chambersburg, PA, August 2006.

8. Progress in Electromagnetics Research Symposium Session on Inverse Problems, Cambridge, MA, March 2006.
9. Progress in Electromagnetics Research Symposium Session on Novel Methods for Solving Forward and Inverse Problems of Radiative Transport, Cambridge, MA, March 2006.
10. Society for Industrial and Applied Mathematics Conference on Control and Its Applications, New Orleans, LA, July 2005.
11. Bioengineering Seminar, Helsinki Institute of Technology, Helsinki, Finland, May 2005.
12. Applied Math Seminar, UC Berkeley, Berkeley, CA, April 2005.
13. Applied Math Seminar, Harvey Mudd College, Claremont, CA, April 2005.
14. Frontiers in Science and Engineering, UC Merced, Merced, CA, February 2005.
15. Optical Imaging Seminar, Mass General Hospital, Boston, MA, February 2005.
16. Computational and Applied Mathematics Seminar, UC Irvine, Irvine, CA, October 2004.
17. Applied Mathematics Seminar, University of California, Davis, CA, April 2004.
18. Optical Society of America Topical Meeting on Biomedical Optics, Miami, FL, April 2004.
19. Interdisciplinary Inverse Problems: Opening Conference for the Center for Inverse Problems at Rensselaer Polytechnic Institute, Troy, NY, April, 2004.
20. Applied Mathematics and Statistics Seminar, University of California, Santa Cruz, CA, February 2004.
21. Biomedical Engineering Seminar, Columbia University, New York, NY, December, 2003.
22. Applied Physics Seminar, Stanford University, Stanford, CA, November, 2003.
23. Natural Sciences Seminar, University of California at Merced, Merced, CA, November, 2003.
24. Physics Seminar, Naval Postgraduate School, Monterey, CA, October, 2003.
25. Applied Mathematics Seminar, Simon Fraser University, Vancouver, B.C., Canada, September 2003.
26. Workshop on Wave Propagation and Time Reversal, University of California, Irvine, CA, August, 2003.
27. Workshop on Inverse Problems and Medical Imaging, Pacific Institute for the Mathematical Sciences, University of British Columbia, Vancouver, B.C., Canada, August, 2003.
28. Institute for Pure and Applied Mathematics Conference of Applied Inverse Problems, Lake Arrowhead, CA, May 2003.
29. Bioengineering Seminar, University of Pennsylvania, Philadelphia, PA, March 2003.
30. Computational Science Colloquium, San Diego State University, San Diego, CA, March 2003.

31. Beckman Laser Institute Seminar, University of California, Irvine, CA, March 2003.
32. Mathematics Sciences Colloquium, Rensselaer Polytechnic Institute, Troy, NY, February 2003.
33. Applied Mathematics Seminar, University of California, Davis, CA, February 2003.
34. Mathematical Geophysics Summer School Seminar, Stanford CA, July 2002.
35. Applied Mathematics Seminar, University of Washington, Seattle, WA, December, 2002.
36. Applied Mathematics Seminar, Universidad Carlos III de Madrid, Spain, November 2002.
37. Applied Mathematics and Statistics Seminar, University of California, Santa Cruz, CA, October 2002.
38. Applied Physics Lab Seminar, University of Washington, Seattle, WA, October 2002.
39. Electrical Engineering Seminar, Washington University, St. Louis, MO, March 2002.
40. Beckman Laser Institute Seminar, University of California, Irvine, CA, March 2002.
41. Mathematics Seminar, University of Central Arkansas, Conway, AK, October 2001.
42. American Mathematical Society Spring Western Sectional Meeting Special Session on Waves in Heterogeneous Media, Las Vegas, NV, April 2001.
43. Mathematics Colloquium, University of Central Florida, Orlando, FL, March 2001.
44. Applied Mathematics Seminar, University of Washington, March 2001.
45. Applied Mathematics Seminar, Stanford University, Stanford, CA, October 2000.
46. Institute for Ultrafast Spectroscopy and Lasers Seminar, City College of New York, New York, NY, June 1999.

### ***Contributed Talks***

1. SPIE International Symposium on Optical Science and Technology, Denver, CO, August 2004.
2. SPIE Photonics West Conference on Biomedical Optics, San Jose, CA, January 2004.
3. SPIE Photonics West Conference on High Powered Lasers and Applications, San Jose, CA, January 2003.
4. SPIE Photonics West Conference on Biomedical Optics, San Jose, CA, January 2003.
5. Postdoc Seminar, Mathematical Sciences Research Institute, Berkeley, CA, September 2001.
6. SPIE Photonics West Conference on Biomedical Optics, San Jose, CA, January 2001.
7. SPIE Photonics West Conference on High Powered Lasers and Applications, San Jose, CA, January 2001.

8. SPIE Photonics West Conference on High Powered Lasers and Applications, San Jose, CA, January 2000.
9. Applied Mathematics Graduate Student Seminar, University of Washington, September 1999.
10. Interdisciplinary Graduate Student Symposium, University of Washington, April 1999.
11. Applied Mathematics Graduate Student Seminar, University of Washington, April 1999.
12. Applied Mathematics Graduate Student Seminar, University of Washington, February 1999.
13. SPIE Photonics West Conference on High Power Lasers and Applications, San Jose, CA, January 1999.
14. Applied Mathematics Graduate Student Seminar, University of Washington, October 1998.
15. IEEE International Geoscience and Remote Sensing Symposium, July 1998.
16. Applied Mathematics Graduate Student Seminar, University of Washington, January 1998.

### **Professional Societies**

Society for Industrial and Applied Mathematics

Optical Society of America

The International Society for Optical Engineering