Patrick O. Kano, Ph.D.

Profile
Eight years of industry and academic experience as an applied mathematician

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Education
Ph.D., M.S., Applied Mathematics
University of Arizona 2005
Diplom-Physik
Dresden University of Technology 2000
B.S., Physics
University of Nevada at Reno 1998

Professional Interests
Algorithm and simulation development for scientific and industrial computing applications
Gaming mathematics
Computational methods for optics
Computational methods for object classification and evidential reasoning
General purpose graphics processing unit [GPGPU] computing
Numerical Laplace transform inversion algorithms

Employment
Senior Multi-Disciplined Engineer II

Raytheon Missile Systems 2013-present

In 2013, I rejoined Raytheon. I returned to my previous position which has focused on the algorithms and simulations to support missile development.

Research Associate

Department of Mathematics, University of Arizona 2011-present

At the University of Arizona, I have remained active in graduate and undergraduate research projects. Some of this work has involved co-mentoring undergraduate senior thesis students; other portions of my research there were conducted jointly with Raytheon employees in Tucson.

Game Mathematician

Scientific Games International 2012-2013

At Scientific Games, I was the mathematician for a small startup video gaming division. In that role, I cooperated with a group of programmers, engineers, and artists to develop and produce casino slot and Keno games. I was responsible for the mathematics behind approximately twenty games.

Part-Time Instructor

Truckee Meadows Community College 2013

I taught one session of Math 126, Pre-Calculus I at TMCC in the spring of 2013.

Cofounder/CEO

Acunum Algorithms and Simulations, LLC 2010-2013

I cofounded Acunum with my former doctoral dissertation advisor in 2010. Acunum offered numerical algorithm and simulation consulting services. We were fortunate to subcontract to Raytheon Missile Systems to provide modeling and simulations for a research project. Acunum was closed in 2013 when I accepted a full time position at Raytheon.

Consultant

PsiNapse Technology, Ltd. 2011-2012

For PsiNapse Technology, Ltd., I worked as a MATLAB programming consultant to Hinman Consulting Engineers in San Francisco. This was a contract position with a finite time frame and specific goals. In this role, I was responsible for rewriting, restructuring, documenting, and placing under configuration control a body of MATLAB code.

Scientist

Applied Energetics, Inc. 2009-2011

Applied Energetics was a small start-up in Tucson, Arizona. As in many small companies, I was responsible for a variety of tasks, depending on the company's needs. My primary responsibility was to provide simulation and modeling support to the laser engineers. This involved a significant amount of modeling in MATLAB and with the finite element software COMSOL. I also wrote a number of white papers and proposals for AE. Some of the research performed there was published with my co-workers. AE closed its doors in 2012.

Senior Multi-Disciplined Engineer I, II

Raytheon Missile Systems 2006-2009

I began working at RMS immediately after completing with my doctoral degree. For Raytheon, I worked on projects in both the Discrimination Product Center (DPC) and Advanced Programs. At the DPC, I worked on software and algorithms to support missile development. In advanced programs, my work was more research oriented. Some of this work in Advanced Programs was published with company approval. Other research there led to a patent for the company. In 2009, I was promoted from senior engineer I to senior engineer II.

Research &Teaching Assistant

University of Arizona 2001-2005

As a graduate applied mathematics student, I taught College Algebra and College Trigonometry for multiple semesters. During my doctoral research, I was a research assistant at the Arizona Center for Mathematical Sciences (ACMS). My doctoral research focused on numerical algorithms for computational optics and numerical Laplace transform inversion.

Mathematics Teacher

Bishop Gorman High School 2001

I worked full time during the spring semester of 2001 as a high school math teacher. I

taught Algebra II, College Trigonometry, and Calculus AB AP.

Research Assistant

Max Planck Institute for the Physics of Complex Systems 1998-2000

I performed my graduate research at the MPI in Dresden, Germany while aat the technical university. My thesis rfocused on pattern formation in reaction diffusion equations.

Papers and Patents

1. Slab delivery of incoherent pump light to double-clad fiber ampliers: Numerical simulations.
P. Kano, D. Kouznetsov, J. Moloney, M. Brio, IEEE Journal of Quantum Electronics, vol. 40, issue 9, pp. 1301-1305, 2004

2. Application of Weeks method for the numerical inversion of the Laplace transform to the matrix exponential.
P. Kano, M. Brio, J. Moloney, Communications in the Mathematical Sciences, vol. 3, no. 3, pp. 335-372, 2005

3. Numerical analysis of the ab-initio computation of the effects of ionization on the nonlinear susceptibilitycoeffcients of the hydrogen atom.
P. Kano, M. Brio, J. Moloney, Communications in the Mathematical Sciences, vol. 4, no. 1, pp. 53-80, 2006

4. Analysis of the analytic dispersion relation and density of states of a selected photonic crystal.
P. Kano, D. Barker, M. Brio, Journal of Physics D.: Applied Physics, vol. 41, 2008

5. Application of Post's formula to optical pulse propagation in dispersive media.
P. Kano, M. Brio, Computers and Mathematics with Applications, vol. 59, no. 2, 2010

6. A fast azimuthally symmetric fluorescence algorithm for thin disk laser modelling.
P. Lundquist, P. Kano, E. Nelson-Melby, JOSA B, vol. 29, no. 4, 2011

7. Dempster-Shafer evidential theory for the automated selection of parameters for Talbot's method contours and application to matrix exponentiation.
P. Kano, M. Brio, P. Dostert, J. Cain, Computers and Mathematics with Applications, vol. 63, no. 11, pp. 1519-1535, 2012

8. Moving mesh adaptive Hough transforms for closed loop LIDAR.
P. Kano, Applied Energetics white paper, 2011

9. Thermally powered low dimensional nano-scale oscillators in coupled micro-scale photonic crystal resonant defect cavities for generation of terahertz or infrared radiation.
W. Owen, D. Barker, P. Kano, with Raytheon, US patent # 8228129

Honors and Awards

Raytheon Missile Systems
Promotion from Engineer III to Engineer IV, 2009
Inventors and Authors Award, 2008

University of Arizona
Galileo Circle Scholar Award, 2004

Dresden University of Technology
Graduated with Distinction, 2000
University of Nevada at Reno
Graduated magna cum laude, 1998
Vernon Frazier Scholarship for Physics, 1997
University of Nevada Presidential Scholarship, 1995-1998

High School
Eagle Scout, 1993

Computer Skills

Languages

MATLAB	[excellent]
C/C++	[proficient]
Mathematica	[proficient]
CUDA	[proficient]

Applications
LATEX
COMSOL
MS Visual Studio
Excel

Language Skills

German
Passed the Deutsche Sprachpruefung fuer den Hochschulzugang auslaendischer Studienbewerber [DSH] (University entrance language exam) 2000

Selected Public Presentations

1. Bell polynomials of the second kind: Matlab central file exchange
P. Kano, M. Brio, 2007
www.mathworks.com/matlabcentral/fileexchange/14483

2. Industrial mathematics insights
P. Kano, D. Barker, University of Arizona NSF-VIGRE undergraduate research experience, 2009

3. Numerical Laplace transform inversion and selected applications
P. Kano, University of Arizona Applied Mathematics Colloquium, 2010

4. A CUDA accelerated Beam Propagation Method [BPM] solver using the parallel computing toolbox
P. Kano, P. Lundquist, E. Nelson-Melby, 2010
www.mathworks.com/matlabcentral/fileexchange/29114-a-cuda-accelerated-beam-propagation-method-bpm-solver-using-the-parallel-computing-toolbox

5. General purpose graphics processing unit computing for mathematicians: An introduction with selected applications
P. Kano, Guest lectures in graduate numerical methods (Math 502), U. Arizona, 2011

6. Weeks' Method for numerical Laplace transform inversion with GPU acceleration
P. Kano, M. Brio, 2011

www.mathworks.com/matlabcentral/fileexchange/30965-weeks-method-for-numerical-laplace-transform-inversion-with-gpu-acceleration

7. Numerical Laplace transform inversion and selected applications
P. Kano, University of Nevada at Reno Mathematics Colloquium, 2011

8. An Accelerated Weeks Method for Numerical Laplace Transform Inversion
P. Kano, GPU Technology Conference, San Jose, 2012

Hobbies
Ballroom Dancing

Citizenship
USA