DR. BOB PALAIS
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EDUCATION

Graduate:

1986 Ph. D. in Mathematics, University of California, Berkeley, Princeton University, 1985-6.

Thesis: Blowup and Stability for an Equation Modeling Stretched Vortices.
Written under the supervision of Professor Andy Majda.

1983 Master of Science, University of California, Berkeley.

Undergraduate:

1980 Bachelor of Science, cum laude in mathematics, Harvard University.

PROFESSIONAL EXPERIENCE

March 2009-present: Research Professor, Math Department, University of Utah.
September 2000-March 2009: Research Associate Professor, Math Department, University of Utah.
January 2007-present: Adj. Research Associate Professor, Pathology Department, University of Utah.

September 1998-August 2000: Associate Professor, Math Department, Westminster College.

September 1996-August 1998: Assistant/Associate Professor, Math Department, Westminster College.

September 1990-August 1996: Assistant Professor, Math Department, University of Utah.

September 1988-August 1990: Morrey Visiting Asst. Professor, UC Berkeley.

September 1986-August 1988: N.S.F Postdoctoral Research Fellow and Visiting Member,
Courant Institute of Mathematical Sciences, New York University.

RESEARCH INTERESTS

High-resolution DNA melting analysis; scientific computation; mathematical visualization and computer graphics; geometry and transformation groups; formation of singularities in solutions of nonlinear PDEs arising in fluid dynamics; theoretical and computational optimal design or materials and microstructures; computational and mathematical molecular biology, bioinformatics, gene expression pattern classification for molecular diagnostics and theraputics; adaptive algorithms (genetic, multigrid, multipole, wavelet, FFT, IFS) for applications in pathology; math education; numerical analysis, mathematical modeling; variational and inverse problems.

SELECTED PUBLICATIONS

2010:

Palais, B., Patents and Mathematics. Letter to the Editor, Notices of the AMS, Vol. 57(1). p. 7.

Palais, B., Understanding Quaternions Geometrically. Loci (formerly JOMA, accepted for publication)

2009:

Palais, RA, Wittwer, CT., Mathematical algorithms for high-resolution DNA melting analysis. (Invited) Methods in Enzymology. Vol. 454. Computer Methods, Part A) Elsevier, Jan. 2009.

Palais, B., Palais, R., Rodi, S., A Disorienting Look at Euler's Theorem on the Axis of a Rotation. Am. Math Monthly. Volume 116, Number 10, December 2009, pp. 892-909(18)

Palais, R and Palais R, Differential Equations, Mechanics, and Computation, IAS/Park City Mathematics Series, American Mathematical Society (2009)

Palais, B. A new formula for computing a rotation matrix. (Submitted, Linear Algebra and its Applications.)

Palais, R., **Palais, B.**, Karcher, H. Point clouds: Distributing points uniformly on a surface.

Kempe-Dustin, J, Aboul-Fadl, T., **Palais, R.**, Gerald J. Gleich, G, Wagner, L., A Cell Based Screening Assay For Identifying Inhibitors of Eosinophil Proliferation (Submitted, International Immunopharmacology.)

2008

Szabo, A., Perou, C., Karaca, M., Perreard, L., **Palais, R**., Quackenbush, J., Bernard, P., Statistical Methods for Selecting Housekeeper Genes. Genome Biology 2008, 9:405

Crews, N., Wittwer, C., **Palais, R**., Gale, B., Product differentiation during continuous-flow thermal gradient PCR. Lab Chip. 2008 Jun;8(6):919-24.

2007

Palais, B., Palais R. Euler's fixed point theorem: The axis of a rotation. J. Fixed Point Theory and Applications. Dec. 2007, Vol. 2, no. 2, 215-220.

Palais R, Quantitative Heteroduplex Analysis, Clin. Chem 2007; 53:1001-3.

Jesse Montgomery, Carl T. Wittwer, **Robert Palais**, Luming Zhou, Simultaneous Mutation Scanning and Genotyping by High-Resolution DNA Melting Analysis. Nature Protocols. 2007 Feb 22;2(1), 59-66.

Erali, M, **Palais, B**, Wittwer, CT. SNP genotyping by unlabeled probe melting analysis. In: Molecular Beacons (Methods in Molecular Biology), Seitz, O and Marx, A, eds., Humana Press, Totowa, New Jersey, 2007.

Vandersteen, JG, Bayrak-Toydemir, P, **Palais RA**, Wittwer CT, Identifying Common Genetic Variants by High-Resolution Melting. Clin. Chem 2007; 53:1191-8.

2005

Palais RA, Liew MA, Wittwer CT. Quantitative heteroduplex analysis for single nucleotide polymorphism genotyping. Anal Biochem. 2005 Nov 1;346(1):167-75.

Zhou L, Wang L, **Palais R**, Pryor R, Wittwer CT. High-resolution DNA melting analysis for simultaneous mutation scanning and genotyping in solution. Clin Chem. 2005 Oct;51(10):1770-7.

2004

L. Zhou, J. Vandersteen, L. Wang, T. Fuller, M. Taylor, **B. Palais**, C.T. Wittwer, High-resolution DNA melting curve analysis to establish HLA genotypic identity. Tissue Antigens 2004, 64:156-164.

M. Liew, R. Pryor, **R. Palais**, C. Meadows, M. Erali, E. Lyon, and C. Wittwer, Genotyping of Single-Nucleotide Polymorphisms by High-Resolution Melting of Small Amplicons, Clinical Chemistry Jul 1, 2004, 50(7).

2003

Elenitoba-Johnson, Kojo S.J., Stephen D. Jenson, Robert T. Abbott, **Robert A. Palais**, Sandra D. Bohling, Zhaosheng Lin, Sheryl Tripp, Paul J. Shami, Lai Y. Wang, Robert W. Coupland, Rena Buckstein, Bayardo Perez-Ordonez, Sherrie L. Perkins, Ian D. Dube, and Megan S. Lim, Involvement of multiple signaling pathways in follicular lymphoma transformation: p38-mitogen-activated protein kinase as a target for therapy. Proceedings of the National Academy of Sciences 2003 100: 7259-7264.

2001 and prior

Palais, R. The Natural Sine and Cosine Curves. Journal of Online Math and its Applications, Jan. 2001

Palais, B. An example demonstrating the fundamental theorem of calculus, College Mathematics Journal, Vol. 29, No. 4, September 1998, pp. 311-2

Palais, B. Pi is wrong!, The Mathematical Intelligencer, Vol. 23, no. 3, Summer 2001, pp. 7-8.

Cherkaev, A. and **Palais, R**. Optimal design of three-dimensional axisymmetric elastic structures. Structural Dynamic Systems, Computational Techniques and Optimization, C. Leondes, ed. Gordon and Breach Intl. Series in Engineering, Technology, and Applied Science, v.9, 1999

Palais, B., Blowup for nonlinear equations using a comparison principle in Fourier space. Comm. Pure and Appl. Math., vol. XLI, pp.165-196 (1988).

SELECTED LECTURES AND PRESENTATIONS

MAA Intermountain Section Meeting, Brigham Young University, Provo, UT, 2008,
A new formula for computing a rotation matrix.

Mathematics Colloquium, USMA, West Point
3D Visualization and Molecular Diagnostics, Feb. 2007

19th International Conference on Technology in Collegiate Mathematics, Boston, MA, Feb. 2007
Pre-Session on 3D Visualization in the Math Curriculum

Applied Mathematical Colloquium, Massachusetts Institute of Technology
Surprising Algorithms for Performing Rotations and their Consequences, Feb. 2007

Institute of Mathematical Sciences Colloquium, University of Virginia, Charlottesville
Modeling and Analyzing DNA Melting Transitions for Molecular Diagnostics, Oct. 2006

AMS-MAA-SIAM Joint Meetings: San Antonio, 2006, Atlanta, GA 2005, Phoenix, AZ 2004.
NSF-DUE Poster Session: Linking visualizations online to discover and unify mathematics.

MAA Intermountain Section Meeting, Idaho State University, Pocatello, ID, 2005,
Odds ratios, event frequencies, and an optimization problem in DNA genotyping.

Beyond Genome Conference, San Francisco, CA 2004 Quantitative heteroduplex analysis for single
nucleotide polymorphism genotyping.

MAA Intermountain Section Meetings, Weber State University, Ogden, UT, 2003,
The belt trick, the plate trick, and orientation entanglement. Rick's College, Idaho Falls, ID, 2001
Enumerating Finite Abelian Groups and Jordan Canonical Forms with the FFT.

Unifying, motivating, and understanding fundamentals using the rotation formula.
Session on Geometry in the Classroom, Joint Math Meetings, San Antonio, Texas, Jan. 1999.

Legendre=Lagrange, An example in duality. MAA Section meeting, Provo, Utah, April, 1998.

SES Annual Meetings, College Station, 1994; New Orleans, 1995.

NIST International Workshop in Optimal Design, Salt Lake City, 1995.

ISSMO 1st World Congress, Goslar, Germany, 1995.

Danish Technical University, Lyngby, Denmark, 1995.

Princeton University, Applied Mathematics Colloquium 1995.

NATO Workshop on Singularities in Vortex Dynamics, Crete, 1992.

ORGANIZING COMMITTEES

High-Resolution DNA Melting Analysis: Simpler and More Efficient Next-generation Molecular Diagnostics. American Association for Clinical Chemistry Annual Meeting, 2006.

The NIST International Workshop on Optimal Design of Materials and Structures. Salt Lake City, Utah, August, 1995.

PATENTS

U.S. Utility Patent Application: Allele Amplification Bias and Quantification. Univ. Utah Res. Foundation. **B. Palais**. Filed Nov. 2009.

U.S. Utility Patent Application: Automated Melting Curve Analysis using Exponential Deviation Analysis. Univ. Utah Res. Foundation. **B. Palais** and Carl Wittwer. Filed March 2009.

U.S. Utility Patent Application: Methods for Generating Point Clouds
Univ. Utah Res. Foundation. **B. Palais,** R. Palais H. Karcher. Filed Aug. 2008.

U.S. Utility Patent Application: Algorithms for Implementing and Interpolating Rotations.
Univ. Utah Res. Foundation. **B. Palais** and R. Palais. Filed Aug. 2008.

U.S. Utility Patent Application: Melting Curve Analysis with Exponential Background Subtraction.
Univ. Utah Res. Foundation. **B. Palais** and Carl Wittwer. Filed Sept. 2006.

U.S. Utility Patent Application: Methods and Compositions Involving Intrinsic Genes.
Univ. Utah Res. Foundation. P. Bernard, C. Perou, and **B.**. Filed Nov. 2006.

U.S. Utility Patent Application: Housekeeper Genes and Methods for Inventing Same.
Univ. Utah Res. Foundation. P. Bernard, C. Perou, and **B. Palais**. Filed July 2005.

POSTERS AND WORKSHOPS

Association for Laboratory Automation, LabAutomation 2008 Palm Springs, CA, Automation of a Genetic Assay With Real and Virtual Instruments, Integrating DNA Extraction, Amplification, High-Resolution Melting, and Analysis.

Association for Molecular Pathology Annual Meeting 2007, Los Angeles, CA. Thermodynamic parameters derived under standard conditions eliminating multiple correction factors.

American Association for Clinical Chemistry Annual Meeting 2006, Chicago, IL Mini-Course on High-Resolution DNA Melting.