

◀ MATHEMATICAL SCIENCES ▶

HIGHLIGHTS

- ◇ UNDERGRADUATE MAJORS SHAUN CECI AND ERIK WHEELER RECEIVED AWARDS FOR EXCELLENCE, CHARLIE DOUGHTY AND SCOTT HYSLOP WERE ROTARY STUDENTS OF THE MONTH, AND THE ROLAND RENNE AWARD (TOP SENIOR MAN) WENT TO ERIK WHEELER.
- ◇ GRADUATE STUDENT JULIA SHARP WAS SELECTED AS THE OUTSTANDING GRADUATE TEACHING ASSISTANT IN THE COLLEGE OF LETTERS OF SCIENCE, WHILE JON HASENBANK WAS THE MSU OUTSTANDING GRADUATE STUDENT.
- ◇ PROFESSORS WARREN ESTY AND JAREK KWAPISZ RECEIVED AWARDS FOR EXCELLENCE.
- ◇ PROFESSOR ISSAC KLAPPER WAS ON SABBATICAL AT THE UNIVERSITY OF NORTH CAROLINA AND AT UCLA STUDYING BIOFILMS.
- ◇ OF 107 UNDERGRADUATE MAJORS, 5 WERE PRESIDENTIAL SCHOLARS AND 18 WERE IN THE HONORS PROGRAM.

Books	2
Technical Manuscripts	7
Refereed Articles	32
Presentations	83
FTE Faculty	27.1
Majors	212
Grant Expenditures	\$604,937

SUMMARY

TEACHING

The Department of Mathematical Sciences delivered about 10% of the total student credit hours at MSU last year. We have 107 undergraduate majors seeking a B.S. degree in one of four options (Applied Mathematics, Mathematics, Mathematics Teaching, Statistics). In addition we have 72 M.S. students and 33 Ph.D. candidates. In 2005, the department awarded 22 Bachelor of Science degrees. Among these B.S. degrees were twelve students who graduated with highest honors, six who graduated with honors, and two who completed the University Honors Program. Also awarded in 2005 were 10 Master of Science degrees and one Doctor of Philosophy degree.

Our students have received several awards this year. Benjamin Bartle, John Cross, Charlie Doughty, Kori Smith, and Matthew Welch were Presidential Scholars. Erik Wheeler joined Charlie Doughty as a member of both Mortar Board and Septemviri. Scott Hyslop and Charlie Doughty were MSU Rotary Students of the Month for February and April, respectively. Erik Wheeler was given the Roland R. Renne Award, the highest honor presented to a senior man. Scott Hyslop and Nora Olsgaard received MSU Student of Achievement Awards. Shaun Ceci and Erik Wheeler received Bozeman Area Chamber of Commerce and MSU Alumni Association Awards for Excellence.

Jon Hasenbank received the Day of Student Recognition Outstanding Graduate Student Award. Julia Sharp was honored as the Outstanding GTA in the College of Letters of Science, the third year in a row that this award went to a GTA in our department. Renee' Thibeault and Jerome Trouba were departmental Outstanding GTAs. Faculty receiving the Bozeman Area Chamber of Commerce and MSU Alumni Association Awards for Excellence were Warren Esty and Jarek Kwapisz.

RESEARCH

Faculty in the Department of Mathematical Sciences have had a productive year in advancing their research programs. Our faculty are working on numerous interdisciplinary research programs involving the Air Force Office of Scientific Research (AFOSR), the Center for Biofilm Engineering (CBE), the Center for Computational Biology (CCB), the Center for Learning and Teaching in the West (CLTW), the Interagency Grizzly Bear Study Team, the Pacific Northwest National Laboratory (PNNL), the Solar Physics Group, the Big Sky Institute (BSI), the US Geological Survey (USGS), Yellowstone National Park, and the Western Transportation Institute (WTI). Cooperative on-campus projects involved the departments of Animal & Range Sciences, Cell Biology & Neuroscience, Chemical Engineering, Civil Engineering, Earth Sciences, Ecology, Education, Entomology, Land Resources & Environmental Sciences, Nursing, Physics, and Psychology.

Several faculty were invited to give international lectures this year. Jarrett Barber spoke in at the Joint Statistical Meeting in Toronto, Canada. Marcy Barge spoke at the Banff International Research Station in Banff, Canada. John Borkowski was a Visiting Professor of Statistics in the Department of Mathematics and Statistics at Thammasat University in Bangkok, Thailand and gave an address at the Joint Statistical Meeting in Toronto, Canada. Steve Cherry was a co-author of a talk presented at Waterton Lake, Canada. Jarek Kwapisz spoke at the Universite Joseph Fourier Grenoble, Grenoble, France and the Stefan Banach International Mathematical Center in Warsaw, Poland. Of more local interest, both John Borkowski and Steve Cherry, continue separate funded research projects with the US Geological Survey concerning wildlife habitat in and around Yellowstone National Park. Each also has separate funded projects with the National Park Service involving habitat studies in Yellowstone. John Borkowski received a Faculty Fellowship from the Pacific Northwest National Laboratory in Richland, Washington, and a sabbatical to participate in the Sabbatical in the Parks program in Yellowstone. Maurice Burke completed his task as the editor of four books in the Navigations Series for the National Council of Teachers of Mathematics. Tomas

Gedeon worked on the five-year, \$18,000,000 INBRE grant, involved with bioinformatics; received a \$599,634 National Science Foundation grant on optimal sensor receptor arrays; and a \$157,263 NSF/NIH grant to study NCR-circuit dynamics. Isaac Klapper received a sabbatical to study biofilms at the University of North Carolina and the Institute of Pure and Applied Mathematics at UCLA. Jennie Luebeck continued work on the \$550,000 DOE-funded Creating Opportunities in Mathematics for Exemplary Teaching (COMET) project, for which she serves as the Evaluation Director. Lisa Davis and Curt Vogel continued their work on separate large Air Force funded projects. Finally, Mark Pernarowski filed for a joint patent for an active electrode bioimpedance-based tissue discrimination system and Curt Vogel filed for two joint patents, one for simulation and open-loop control of non-hysteretic continuous faceshed deformable mirrors and one for a method to determine arbitrary relative motion estimates between time-separated image frames. Janet Sharp's textbook, *Learning and Teaching K-8 Mathematics*, was published by Allyn & Bacon Publishers. Linda Simonsen began work on the Big Sky Institute GK-12 project, a \$1,768,000 NSF grant.

This year, Maurice Burke's Ph.D. student, Kimberley Graham, finished her degree and is now teaching at Westminster College in Salt Lake City, Utah. Lisa Davis directed a team involving postdocs, Faranak Pahlevani and John Singler, and graduate students, Mike Bowman and Jennifer Thorenson, that investigated unmanned air vehicles. Tomas Gedeon worked with graduate students Bree Cummins, Shaun Harker, and Kate Rardin on computational neuroscience. Curt Vogel and his postdoc, Qing Yang, looked into atmospheric optics and the use of giant telescopes.

SERVICE

The Department of Mathematical Sciences serves the local and campus community, as well as the region, state and nation, in a variety of ways. All of the faculty contribute to department and campus activities. In addition, our faculty contribute to numerous efforts to improve our state. Maurice Burke is on the Mathematics Standards Review Committee, convened by the Superintendent of Public Instruction. Warren Esty is on the Mathematics Higher Education Transfer Steering Committee, convened by the Commissioner of

Higher Education. For the Montana Chapter of the American Statistical Association, Sherry Heis was the Secretary/Treasurer, Mark Greenwood was the Vice-President, and Jarrett Barber was the Chapter Representative. Jennie Luebeck was on both the Board of Directors of the Montana Council of Teachers of Mathematics and the Board of Directors of the Montana Learning Center for Mathematics and Science.

Beyond the borders of Montana, several faculty contribute to their profession in a variety of ways. Robert Boik is an Editorial Board member for *Psychological Methods*. John Borkowski is an Associate Editor for both *The American Statistician* and the *Journal of Probability and Statistical Science*. Maurice Burke is the Chair of the National Advisory Board for the SIMMS-IM Dissemination Grant. Jack Dockery and Tomas Gedeon both served on NSF/NIH review panels. Tomas Gedeon is an Associate Editor for the *Rocky Mountain Journal of Mathematics*. Ted Hodgson supervises the E-Teaching Tools section of the online journal, *On-Math*, and served on an External Grant Review Panel for the Content Review Committee for the Progress Toward Standards Assessment Project. He also served as Project Evaluation Chair for the Algebra Reform in Montana Tribal Colleges program, an NSF-CCLI program, and on the Advisory Board for the PIPESTEM Mathematics and Science Education Project, an NSF Tribal Colleges and Universities Program. Linda Simonsen is the co-editor of Connecting Research to Teaching for the *Mathematics Teacher* and served on the Advisory Board for the Metro Math NSF Center in Philadelphia, Pennsylvania.

PUBLICATIONS

A. BOOKS / EDITED COLLECTIONS / FULL-LENGTH WORKS

BURKE, M.

Navigating Through Measurement in Grades 9-12, Edited by M. Burke with chapters by M. Albrecht, M. Burke, W. Ellis, D. Kennedy, and E. Maletsky, National Council of Teachers of Mathematics, Reston, Virginia, 170 pages, (2005).

SHARP, J. M.

Learning and Teaching K-8 Mathematics, J. M. Sharp and K.

B. Hoiberg, Allyn & Bacon, Boston, Massachusetts, 368 pages, (2005).

B. TECHNICAL MANUSCRIPTS

BOIK, R.

A Pair of Primers: Primer on Matrix Analysis and Primer on Linear Statistical Models, R. Boik, Department of Mathematical Sciences, Montana State University, Bozeman, Montana, 369 pages, (2005).

Statistics for Researchers, R. Boik, Department of Mathematical Sciences, Montana State University, Bozeman, Montana, 141 pages, (2005).

BORKOWSKI, J.

“Evaluating Wildlife Responses to Winter Human Use in Yellowstone National Park: A Statistical Analysis of the Bison, Elk, and Trumpeter Swan Winter Use Wildlife Road Survey Data, December 2004 to April 2005,” J.J. Borkowski, Yellowstone Center for Resources Report, Yellowstone National Park, Mammoth, Wyoming, (May 18, 2005).

“Wildlife Responses to Motorized Winter Recreation in Yellowstone—2005 Annual Report,” P.J. White, T.D. Davis, J. Borkowski, D. Reinhart, C. McClure, and P. Perotti, Yellowstone Center for Resources Report, Yellowstone National Park, Mammoth, Wyoming, (June 22, 2005).

CHERRY, S.

“The Feasibility of Detecting Trends in Whitbark Pine Cone Counts,” S. Cherry, in C.C. Schwartz, M.A. Haroldson, and K. West (Eds), *Yellowstone Grizzly Bear Investigations: 2004 Annual Report of the Interagency Grizzly Bear Study Team*, US Geological Survey, Bozeman, Montana, Appendix B, 87-91, (2005).

“Interagency Whitebark Pine Health Monitoring Program for the Greater Yellowstone Ecosystem,” S. Cherry, in C.C. Schwartz, M.A. Haroldson, and K. West (Eds), *Yellowstone Grizzly Bear Investigations: 2004 Annual Report of the Interagency Grizzly Bear Study Team*, US Geological Survey, Bozeman, Montana, 92-125, (2005).

“Reassessing Sustainable Mortality Limits for the Greater Yellowstone Ecosystem Grizzly Bear,” S. Cherry, *US Geological Survey Northern Rocky Mountain Science Center Report*, Montana State University, Bozeman, Montana, (2005).

C. REFEREED JOURNAL ARTICLES

BARGE, M.

“Elements of the Theory of Unimodular Pisot Substitutions with an Application to β -shifts,” M. Barge and J. Kwapisz, in Algebraic and Topological Dynamics, S. Kolyada, Y. Manin, and T. Ward (Eds.), *Contemporary Mathematics*, 385, 89-99, (2005).

BOIK, R.

“Second-Order Accurate Inference on Eigenvalues of Covariance and Correlation Matrices,” R. Boik, *Journal of Multivariate Analysis*, 96, 136-171, (2005).

“Effect Size and Power in Assessing Moderating Effects of Categorical Variables Using Multiple Regression: A 30 Year Review,” H. Aguinis, J.C. Beaty, R.J. Boik, and C.A. Pierce, *Journal of Applied Psychology*, 90, 94-107, (2005).

“Randomization,” R.J. Boik, in B.S. Everitt and D.C. Howell (Eds.), *Encyclopedia of Statistics in Behavioral Science*, 4, 1669-1674, (2005).

BORKOWSKI, J.

“A Review of Adaptive Cluster Sampling: 1990-2003,” P. Turk and J.J. Borkowski, *Ecological and Environmental Statistics*, 12, 55-94, (2005).

“Herbicide Effects on Density of Biomass of Russian Knapweed (*Acroptilon repens*) and Associated Plant Species,” S.M. Laufenberg, R.L. Sheley, J.S. Jacobs and J. Borkowski, *Weed Technology*, 19, 62-72, (2005).

“Plant Functional Group Diversity as a Mechanism for Invasion Resistance,” M.L. Pokorny, R.L. Sheley, C.A. Zabinski, R.E. Engel, T.J. Svejcar and J.J. Borkowski, *Restoration Ecology*, 13, 448-459, (2005).

BURKE, M.

“Tennis, Anyone?,” T. Hodgson and M. Burke, *Mathematics Teacher*, 98(9), 586-592, (2005).

“Classic Examples of Measurement,” M. Burke, in M. Albrecht and M. Burke (Eds), *Navigating Through Measurement in Grades 9-12*, National Council of Teachers of Mathematics, Reston, Virginia, 55-70, (2005).

DAVIS (STANLEY), L.

“A Petrov Galerkin Finite-Element Method for

Interface Problems Arising in Sensitivity Computations,” J.A. Burns, T. Lin, and L.G. Stanley, *Computers and Mathematics with Applications*, 49, 1889-1903, (2005).

DOCKERY, J.

“Traveling Wave Solutions of a Reaction Diffusion Model for Competing Pioneer and Climax Species,” S. Brown, J. Dockery, and M. Parnarowski, *Mathematical Biosciences*, 194(1), 21-36, (2005).

“Adaptive Responses to Antimicrobial Agents in Biofilms,” B. Szomolay, I. Klapper, J. Dockery, and P.S. Stewart, *Environmental Microbiology*, 7(8), 1186-1191, (2005).

ESTY, W.

“Teaching about Inverse Functions,” *The AMATYC Review*, Spring 2005, 4-10, (2005).

GEDEON, T.

“Structure Theorems and the Dynamics of Nitrogen Catabolite Repression in Yeast,” E. Boczko, T. Cooper, T. Gedeon, K. Mischaikow, S. Pratap, and S. Wells, *Proceedings of National Academy of Science*, 102(16), 5647-5652, (2005).

“Dejittered Spike-Conditioned Stimulus Waveforms Yield Improved Estimates of Neuronal Feature Selectivity and Spike-Timing Precision of Sensory Interneurons,” Z. Aldworth, J. Miller, T. Gedeon, G. Cummins, and A. Dimitrov, *The Journal of Neuroscience*, 25 (22), 5323-5332, (2005).

“Hyperbolic Fixed Points are Typical in the Space of Mixing Operators for the Infinite Population Model Genetic Algorithm,” C. Hayes and T. Gedeon, *Workshop Proceedings of Genetic and Evolutionary Computation Conference (GECCO 2005)*, ACM, 358-361, (2005).

GEYER, L.

“A Hyperbolic Surface With a Square Grid Net,” L. Geyer and S. Merenkov, *Journal d'Analyse Mathematique*, 96, 357-367, (2005).

“Herman Rings and Arnold Disks,” X. Buff, N. Fagella, L. Geyer, and C. Henriksen, *Journal of the London Mathematical Society*, 72(3), 689-716, (2005).

HAMILTON, M.

“Statistical Assessment of a Laboratory Method for

Growing Biofilms,” D.M. Goeres, L.R. Loetterle, M.A. Hamilton, R. Murga, D.W. Kirby, and R.M. Donlan, *Microbiology*, 151, 757-762, (2005).

HASENBANK, J.

“Multivariate Calculus Student Perceptions: Homework, Quizzes, and Motivation, J. Hasenbank, *The Researcher*, Published by the Northern Rocky Mountain Educational Research Association, (2005).

“A Vision of a Three-Dimensional Re-Conceptualization of Mathematical Knowledge,” In Lloyd, G. M., Wilson, M., Wilkins, J. L. M., & Behm, S. L. (Eds.), http://convention2.allacademic.com/index.php?cmd=pmena_guest, *Proceedings of the 27th Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education*, (2005).

HAYES, C.

“Hyperbolic Fixed Points are Typical in the Space of Mixing Operators for the Infinite Population Model Genetic Algorithm,” C. Hayes and T. Gedeon, *Workshop Proceedings of Genetic and Evolutionary Computation Conference (GECCO 2005)*, ACM, 358-361, (2005).

HODGSON, T.

“Mathematics, Models, and a Model of Mathematics in the Biology Classroom,” T. Hodgson, R. Keck, R. Patterson, and D. Maki, *Journal of College Science Teaching*, 34(5), 46-50, (2005).

“Geometric Probability and the Areas of Leaves,” K. Hoiberg, J. Sharp, T. Hodgson, and J. Colbert, *Mathematics Teaching in the Middle School*, 10(7), 326-332, (2005).

“Tennis, Anyone?” T. Hodgson and M. Burke, *Mathematics Teacher*, 98(9), 586-592, (2005).

KLAPPER, I.

“Adaptive Responses to Antimicrobial Agents in Biofilms,” B. Szomolay, I. Klapper, J. Dockery, and P.S. Stewart, *Environmental Microbiology*, 7(8), 1186-1191, (2005).

KWAPISZ, J.

“Elements of the Theory of Unimodular Pisot Substitutions with an Application to β -shifts,” M.

Barge and J. Kwapisz, in Algebraic and Topological Dynamics, S. Kolyada, Y. Manin, and T. Ward (Eds.), *Contemporary Mathematics*, 385, 89-99, (2005).

PERNAROWSKI, M.

“Traveling Wave Solutions of a Reaction Diffusion Model for Competing Pioneer and Climax Species,” S. Brown, J. Dockery, and M. Pernarowski, *Mathematical Biosciences*, 194(1), 21-36, (2005).

SHARP, J. M.

“Geometric Probability and the Areas of Leaves,” K. Hoiberg, J. Sharp, T. Hodgson, and J. Colbert, *Mathematics Teaching in the Middle School*, 10(7), 326-332, (2005).

SZOMOLAY, B.

“Adaptive Responses to Antimicrobial Agents in Biofilms,” B. Szomolay, I. Klapper, J. Dockery, and P.S. Stewart, *Environmental Microbiology*, 7(8), 1186-1191, (2005).

TURK, P.

“A Review of Adaptive Cluster Sampling: 1990-2003,” P. Turk and J.J. Borkowski, *Ecological and Environmental Statistics*, 12, 55-94, (2005).

YANG, Q.

“Hysteresis Correction in the Curvature Adaptive Optics System,” Q. Yang, C. Ftaclas, M. Chun, and D. Toomey, *Journal of the Optical Society of America (JOSA A)*, 22, 142-147, (2005).

PRESENTATIONS

BARBER, J.

“Modeling Map Positional Error to Infer About True Feature Location,” with A. E. Gelfand and J. A. Silander, Jr., 2005 Joint Statistical Meetings, Minneapolis, Minnesota, August 2005.

BARGE, M.

“The Geometric Coincidence Conjecture,” with J. Keapisz, Focused Research Group in The Topology of Aperiodic Order, Banff International Research Station, Banff, Alberta, Canada, July 2005.

“Augmented Cohomology,” Focused Research Group in

the Topology of Aperiodic Order, Banff International Research Station, Banff, Alberta, Canada, July 2005.

“The Coincidence Conjectures,” with J. Kwapisz, Summer Topology Conference, Denison University, Denison, Ohio, July 2005.

“The Geometry of Pisot Numbers,” with J. Kwapisz, Department of Mathematics Colloquium, College of Charleston, Charleston, South Carolina, October 2005.

BORKOWSKI, J.

“An Introduction to Mixture Designs,” Slipakorn University, Bangkok, Thailand, July 2005.

“Uniform Space-Filling Designs,” Slipakorn University, Bangkok, Thailand, July 2005.

“More Space Filling Designs for High-Dimensional Constrained Mixture Experiments,” 2005 Joint Statistical Meetings, Minneapolis, Minnesota, August 2005.

“Space Filling Designs for High-Dimensional Constrained Mixture Experiments,” 2005 Meeting of the Montana Chapter of the American Statistical Association, Butte, Montana, September 2005.

“Wildlife Responses to Snowmobiles in Yellowstone 1998-2004,” with P.J. White, R.A. Garrott, A. Hardy, and T. Davis, The Wildlife Society 12th Annual Conference, Madison, Wisconsin, Presenter: P.J. White, September 2005.

“Wolf Recovery and Predation in Central Yellowstone: Trends for an Elk-Bison System,” with M. Becker, R. Jaffe, E. Bergman, and R.A. Garrott, The Wildlife Society 12th Annual Conference, Madison, Wisconsin, Presenter: M. Becker, September 2005.

“Bison Winter Road Travel: Facilitated by Road Grooming or a Manifestation of Natural Patterns?”, with J. Bruggerman, D. Bjornlie, R.A. Garrott, and F.G.R. Watson, The Wildlife Society 12th Annual Conference, Madison, Wisconsin, Presenter: J. Bruggerman, September 2005.

“Weighted Design Optimality Criteria for Spherical Response Surface Designs,” with Boonorm Chomtee, 2nd International Symposium on Mathematical, Statistical and Computer Sciences, sponsored by King Mongkut’s Institute of Technology Ladkrabang, Thailand, and Tokai University, Japan, Presenter:

Boonorm Chomtee, February 2005.

BURKE, M.

“Using CAS to Build Algebra with Understanding,” T3 Regional Conference Workshop, Montana Learning Center at Canyon Ferry, April 2005.

“Lessons in Developing On-line Graduate course,” CLTW Summer Institute, Breckenridge, Colorado, August 2005.

“Overview of CLTW Triad on Curriculum, Assessment, and Evaluation,” CLTW Summer Institute, Breckenridge, Colorado, August 2005.

“The Geometric Sequence – It’s Everywhere,” Montana Education Association/Montana Federation of Teachers Educators’ Conference, Missoula, Montana, October 2005.

CHERRY, S.

“Monitoring Whitebark Pine in the Greater Yellowstone Ecosystem,” with E. Shanahan, G.A. DeNitto, S. Cherry, M. Maj, D.P. Reinhart, C.C. Schwartz, R.E. Bennetts, Annual Forest Health and Monitoring Conference, awarded “best overall graphics”, Miami, Florida, Presenter: G.A. DeNitto, January 2005.

“Monitoring Whitebark Pine in the Greater Yellowstone Ecosystem,” with E. Shanahan, G.A. DeNitto, S. Cherry, M. Maj, D.P. Reinhart, C.C. Schwartz, R.E. Bennetts, Annual Whitebark Pine Ecosystem Foundation Meeting, Waterton Lake, Canada, Presenter: D.P. Reinhart, February 2005.

Monitoring Whitebark Pine in the Greater Yellowstone Ecosystem,” with E. Shanahan, G.A. DeNitto, S. Cherry, M. Maj, D.P. Reinhart, C.C. Schwartz, R.E. Bennetts, Eighth Biennial Conference, Yellowstone National Park, Mammoth, Wyoming, Presenter: M. Maj, October 2005.

DAVIS (STANLEY), L.

“Sensitivity Analysis for Optimal Design and Control of Advanced Guidance Systems,” with F. Pahlevani and M. Bowman, Air Force Office of Scientific Research (AFOSR) Contractors’ Meeting – Dynamics and Control, Long Beach, CA, August 2005.

ESTY, W.

“A Line of Reasoning in Trigonometry,” Montana Education Association/Montana Federation of Teachers

Educators' Conference, Missoula, Montana, October 2005.

"Reasoning in Trigonometry," Creating Opportunities in Mathematics for Exemplary Teaching (COMET) Workshop, Canyon Ferry, Montana, June 2005.

GEDEON, T.

"Oscillations in Multi-stable Monotone Systems with Slowly Varying Feedback," SIAM Control Theory Meeting, New Orleans, Louisiana, June 2005.

"Hyperbolic Fixed Points are Typical in the Space of Mixing Operators for the Infinite Population Model Genetic Algorithm", with C. Hayes, Genetic and Evolutionary Computation Conference (GECCO), Presenter: C. Hayes, Washington, D.C., June 2005.

"Correspondence Maximization," Georgia Tech University, Atlanta, Georgia, November 2005.

GREENWOOD, M.

"Functional Data Analysis for Valley Elevation Cross-Profiles," University of Nevada-Reno, Reno, Nevada, February 2005.

"U and V-Shaped Valley Profiles and Careers in Statistics," Central Academy, AP Statistics Courses, Des Moines, Iowa, March 2005.

"Statistical Methods for Valley Elevation Cross-Profiles," University of Montana, Missoula, Montana, April 2005.

"A Brief Intro to Functional Data Analysis," Annual Meeting of the Montana Chapter of the American Statistical Association, Butte, Montana, September 2005.

HAMILTON, M.

"Using a Minimum Anderson-Darling Discrepancy Fit of a Three-Parameter Pareto Distribution to Estimate the Rate at which Large Cell Clumps Detach from a Bacterial Biofilm," Hawaii International Statistics Conference, Honolulu, Hawaii, January 2005.

HASENBANK, J.

"A Vision of a Three-Dimensional Re-Conceptualization of Mathematical Knowledge," 27th Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics

Education, Eugene, Oregon, October 2005.

"Teaching for Procedural Understanding in Algebra," University of Wisconsin - La Crosse, La Crosse, Wisconsin, November 2005.

HAYES, C.

"An Introduction to Modelling Spread of Contagious Disease," Mount Marty College, Yankton, South Dakota, November 2005.

"The Infinite Population Genetic Algorithm and a Generic Property", Summer Conference on Topology and Its Applications (SumTopo), Denison, Ohio, July 2005.

"Hyperbolic Fixed Points are Typical in the Space of Mixing Operators for the Infinite Population Model Genetic Algorithm", Genetic and Evolutionary Computation Conference (GECCO), Washington, D.C., June 2005.

"A Generic Property of the Infinite Population Genetic Algorithm," Boise State University, Boise, Idaho, May 2005.

"The Infinite Population Genetic Algorithm: An Introduction to Genericity Results", University of St. Thomas, Houston, Texas, February 2005.

"The Genetic Algorithm: A Dynamical Systems Model and Generic Properties", University of Houston-Clear Lake, Houston, Texas, February 2005.

HODGSON, T.

"The Mathematics of Tennis," 2005 Montana Council of Teachers of Mathematics Professional Development Academy, Helena, Montana, July 2005.

KLAPPER, I.

"Navier-Stokes Computations Involving Phases with Highly Discontinuous Viscosities," Mathematics Department Colloquium, Virginia Polytechnic Institute & State University, Blacksburg, Virginia, April 2005.

"Mechanical Properties of Bacterial Biofilms," Applied Mathematics Lab Seminar, Courant Institute of Mathematical Sciences, New York University, New York City, New York, October 2005.

KWAPISZ, J.

“Geometric Coincidence Condition and Pure Discrete Spectrum Conjecture for Unimodular Pisot Tiling Spaces,” Numeration, Tilings, and Substitutions Conference, Universite Joseph Fourier Grenoble, Grenoble, France, March 2005.

“Hyperbolic Pseudo-Anosov Maps a.e. Embed into Toral Automorphisms,” The International Conference in Dynamical Systems, Stefan Banach International Mathematical Center, Warsaw, Poland, June 2005.

“The Geometric Coincidence Conjecture,” with M. Barge, Focused Research Group in The Topology of Aperiodic Order, Banff International Research Station, Banff, Alberta, Canada, Presenter: M. Barge, July 2005.

“The Coincidence Conjectures,” with M. Barge, Summer Topology Conference, Denison University, Denison, Ohio, Presenter: M. Barge, July 2005.

“The Geometry of Pisot Numbers,” with M. Barge, Department of Mathematics Colloquium, College of Charleston, Charleston, South Carolina, Presenter: M. Barge, October 2005.

“Geometric Coincidence Conjecture for Pisot Tilings,” Midwest Dynamical Systems Seminar, Northwestern University, Evanston, Illinois, October 2005.

LATULIPPE, J.

“Weakly Non-Autonomous Bursting Model for Visual Neurons,” with M. Pernarowski Frontiers in Applied and Computational Mathematics, New Jersey Institute of Technology, Newark, New Jersey, Presenter: M. Pernarowski, May 2005.

LUEBECK, J.

“Constructing Better Teachers: Content-Based Mentoring in an Online Setting,” National Council of Teachers of Mathematics Western Regional Conference, Denver, Colorado, November 2005.

“The CRIME Inquiry Model for Mathematics and Science Investigations,” e-Mentoring Fall Workshop at Montana Education Association/Montana Federation of Teachers Educators’ Conference, Missoula, Montana, October 2005.

“On-Line Discourse as a Mechanism of Knowledge Co-Construction among Mathematics and Science

Teachers,” with L. Bice and J. Luebeck, 4th Annual Research Forum, Center for Learning and Teaching in the West, Bozeman, Montana, Presenter: L. Bice, April 2005.

PAHLEVANI, F.

“Semi-Implicit Schemes and Sensitivity Computations for Eddy Viscosity Models,” 25th Annual Southeastern-Atlantic Regional Conference on Differential Equations (SEARCDE 25), University of Dayton, Dayton, Ohio, October 2005.

“Sensitivity Computations of Subgrid Eddy Viscosity Models,” Finite Element Circus, University of Delaware, Newark, Delaware, April 2005.

PARKER, A.

“Symmetry Breaking when Deciphering the Neural Code” Mathematics Colloquium, University of Montana, Missoula, Montana, September 2005.

“Dewarping Images from a Scanning Laser Ophthalmoscope” Center for Adaptive Optics, SLO Image Processing Meeting, University of California at Berkeley, Berkeley, California, April 2005.

PERNAROWSKI, M.

“Return Map Characterizations for a Model of Bursting with Two Slow Variables,” with R. Griffiths, Frontiers in Applied and Computational Mathematics, New Jersey Institute of Technology, Newark, New Jersey, Presenter: M. Pernarowski, May 2005.

“Weakly Non-Autonomous Bursting Model for Visual Neurons,” with J. Latulippe, Frontiers in Applied and Computational Mathematics, New Jersey Institute of Technology, Newark, New Jersey, Presenter: M. Pernarowski, May 2005.

SHARP, J. L.

“Engine Removal Projection (ERP) Tool,” Intelligent Ships Symposium VI, Villanova, Pennsylvania, June 2005.

“What is the 'Detection Limit' when using Dilution Series Methods for Counting Bacteria?” Center for Biofilm Engineering Technical Advisory Conference, Montana State University, Bozeman, Montana, February 2005.

“Center for Molecular and Cellular Systems: Statistical

Screens for Datasets from High-Throughput Protein Pull-Down Assays," Genomes to Life Contractor Grantee Workshop III, Washington D.C., February 2005.

SHARP, J. M.

"The Impact of Classroom Research on Student and Teacher Learning—Division of Fractions," National Council of Teachers of Mathematics, Anaheim, California, April 2005.

"Contexts to Divide Fractions—Fair Sharing or Partitive Definitions?" National Council of Teachers of Mathematics 2005 Annual Meeting, Anaheim, California, April 2005.

SIMONSEN, L.

"Teachers' Discourse Moves: Analysis of Discourse in the Collegiate Classroom and its Extension to Teacher Professional Development," Ninth Annual AMTE Conference, Dallas, Texas, January 2005.

"Partnering with Rural Schools in the Greater Yellowstone Ecosystem," GK-12 Regional Meeting, University of Utah, Salt Lake City, Utah, November 2005.

VOGEL, C.

"Wavefront Reconstruction for Extremely Large Telescopes," IPAWS (Image Processing and Analysis Working Seminar), Institute for Mathematical Analysis (IMA), University of Minnesota, Minneapolis, Minnesota, April 2005.

"Adaptive Optics and Wavefront Reconstruction," Data Driven Modeling and Analysis (DDMA) seminar, Los Alamos National Laboratory, Los Alamos, New Mexico, May 2005.

"Efficient Algorithms for Wavefront Reconstruction for Extremely Large Telescopes," Optical Society of America (OSA) topical conference on Adaptive Optics and Signal Recovery and Synthesis, Charlotte, North Carolina, June 2005.

"Motion Estimation for Adaptive Optics Scanning Laser Ophthalmoscopy," Optical Society of America (OSA) topical conference on Adaptive Optics and Signal Recovery and Synthesis, Charlotte, North Carolina, June 2005.

"Predictive Algorithms in Wavefront Reconstruction for Extremely Large Telescopes," Workshop on Mathematical and Computational Geosciences, Golden, Colorado, June 2005.

"Micro-Electro-Mechanical-Systems (MEMS) Device Modeling," Lockheed Advanced Technology Center, Palo Alto, California, August 2005.

"Micro-Electro-Mechanical-Systems (MEMS) Device Modeling," Thirty Meter Telescope (TMT) Project, Pasadena, California, August 2005.

"Estimation Theory," tutorial at CfAO Summer School on Adaptive Optics, Santa Cruz, California, August 2005.

"Computational Mathematics," tutorial at CfAO Summer School on Adaptive Optics, Santa Cruz, California, August 2005.

"Motion Estimation in Scanning Laser Ophthalmoscopy," OpTec Seminar, Montana State University, Bozeman, Montana, September 2005.

"MEMS Device Modeling," Mathematics Colloquium, University of Montana, Missoula, Montana, September 2005.

"MEMS Device Modeling and Control," Numerical Analysis / Scientific Computing Seminar, Courant Institute of Mathematical Sciences, New York University, New York City, New York, October 2005.

YANG, Q.

"Modeling and Optimal Control of MEMS Deformable Mirrors with Continuous Facesheet," Optical Society of America (OSA) meeting on Adaptive Optics: Analysis and Methods, Charlotte, North Carolina, June 2005.

"Fourier Domain Preconditioner for Estimation and Fitting of Turbulence Profiles," Optical Society of America (OSA) meeting on Adaptive Optics: Analysis and Methods, Charlotte, North Carolina, June 2005.

"Fast Algorithms for Wavefront Reconstruction in Mild Turbulence," Optical Society of America (OSA) meeting on Adaptive Optics: Analysis and Methods, Charlotte, North Carolina, June 2005.

"Adaptive Optics for Ground-Based Optical Telescopes," OpTec Seminar, Montana State University, Bozeman, Montana, February 2005.

“Fourier-Domain Preconditioned Conjugate Gradient Algorithms for Atmospheric Tomography,” Spring Workshop of the Center for Adaptive Optics, Santa Cruz, California, April 2005.

“Bimorph Deformable Mirrors for Correcting Aberrations of Human Eyes,” OpTec Seminar, Montana State University, Bozeman, Montana, September 2005.

GRANTS

A. FUNDED EXTERNAL GRANTS

ANDERSEN, L.

“Six Through Eight Mathematics Curriculum Revision Project,” NSF, PI: R. Billstein, co-PI: L. Andersen, T. Hodgson, and J. Williamson, \$1,610,000, (2002-2006).

BORKOWSKI, J.

“Evaluating variability, patterns and presentation of acoustic data collected during the winter use season in Yellowstone National Park,” National Park Service, PI: J.J. Borkowski, \$11,750, (2005-2007).

“Evaluating Wildlife Responses to Winter Human Use in Yellowstone National Park,” National Park Service, PI: J.J. Borkowski, \$10,000, (2005-2007).

CHERRY, S.

“Nonparametric Modeling of Species’ Habitat Selection Probabilities in Use-Availability Studies,” USGS, PI: S. Cherry, co-PI: K. Keating, \$42,011, (2004-2005).

“Evaluation and Improvement of Food Monitoring Program for the Yellowstone Grizzly,” USGS – Interagency Grizzly Bear Study Team, PI: S. Cherry, co-PI: C. Schwartz, \$12,000, (2004-2005).

“Statistical Support for Analysis and Design of Vital Signs Monitoring”, National Park Service, PI: S. Cherry, co-PI: R. Bennetts, \$20,125, (2004-2006).

DAVIS (STANLEY), L.

“Sensitivity Analysis for the Optimal Design and Control of Advanced Guidance Systems,” DEPSCoR/AFOSR, PI: L. Davis (Stanley), \$750,000, (2003-2006).

DOCKERY, J.

“Modeling Antibiotic Susceptibility of Bacteria in Biofilm,” NIH, PI: P. Stewart, co-PI: J. Dockery, I. Klapper, and P. Stoodley, \$846,000, (2002-2006).

GEDEON, T.

“Optimality of a Sensory Receptor Array,” NSF, PI: T. Gedeon, co-PI: J. Miller and G. Jacobs, \$599,634, (2005-2008).

“Collaborative Proposal: NCR-circuit Dynamics,” NSF/NIH, PI: T. Gedeon, co-PI: K. Michaikow, E. Boczko, and T. Cooper, \$157,263, (2005-2008).

“Algorithms for Decoding and Modulations of Neural Spike Trains (Biological Information Technology and Systems),” NSF, PI: J. Miller, co-PI: T. Gedeon, B. Mumey, and R. Snyder, \$1,400,000, (2002-2006).

HAMILTON, M.

“Antimicrobial Test Methodology: Statistical Support,” EPA, PI: M. Hamilton, \$850,000, (2002-2006).

“Research for the Manufacturing and Marketing of the Drip Flow Biofilm Reactor,” Montana Board of Commercialization and Technology, co-PI: D. Goeres and M. Hamilton, \$146,600, (2004-2005).

HODGSON, T.

“Six Through Eight Mathematics Curriculum Revision Project,” NSF, PI: R. Billstein, co-PI: L. Andersen, T. Hodgson, and J. Williamson, \$2,300,000, (2002-2006).

“Center for Teaching and Learning in the West,” NSF, PI: E. Swanson, co-PI: M. Anneking, T. Hodgson, B. Mayes, and G. Tuthill, \$9,980,000, (2001-2006).

KLAPPER, I.

“Modeling Antibiotic Susceptibility of Bacteria in Biofilm,” NIH, PI: P. Stewart, co-PI: J. Dockery, I. Klapper, and P. Stoodley, \$846,000, (2002-2006).

KWAPISZ, J.

“Torus Maps and Cocyclic Subshifts,” NSF, PI: J. Kwapisz, \$71,719, (2002-2006).

LUEBECK, J.

“Creating Opportunities in Mathematics for Exemplary Teaching (COMET),” US Department of Education Mathematics and Science Partnership Initiative, Montana

Council of Teachers of Mathematics (MCTM), PI: Jean Howard (MCTM), co-PI: J. Luebeck, \$550,000, (2004-2006).

ROBISON-COX, J.

“From Bias to Exclusion: Why So Few Women at the Top?,” NSF, Co-PIs: R. Martell and J. Robison-Cox, \$86,819, (2002-2005).

SIMONSEN, L.

“BSI GK-12—Science and Society Fellows,” NSF, PI: L. Graumlich, co-PI: L. Simonsen, A. Mistretta, and E. Swanson, \$1,768,000, (2005-2008).

“Wildlife Education in Big Sky: Enhancing Environmental Education for Montana and Idaho’s Teachers,” Charlotte Martin Foundation, PI: L.J. Graumlich, Co-PI: L. Simonsen, \$49,292, (2003-2005).

VOGEL, C.

“Computational Methods in Advanced Imaging Sciences,” DEPSCoR/AFOSR, PI: C.R. Vogel, \$462,679, (2002-2006).

“Inverse Problems in Neurobiological Imaging,” NSF/EPSCoR, PI: C.R. Vogel, Co-PI: J. Miller, \$20,000, (2004-2005).

“Motion Tracking and Dewarping for Adaptive Optics Scanning Laser Ophthalmoscopy,” NSF, PI: C.R. Vogel, \$44,219, (2004-2005).

“Motion Tracking and Dewarping for Adaptive Optics Scanning Laser Ophthalmoscopy,” NSF, PI: D. Arathorn, co-PI: C.R. Vogel and A. Roorda, \$99,970, (2005-2006).

“Algorithms and Software Related to the Real Time Computer Feasibility Study for the Thirty Meter Telescope Project,” Research Corporation, \$35,000, (2005-2006).

B. FUNDED INTERNAL GRANTS

BOIK, R.

“Principal Components,” BEST Award, \$6,600, (2005).

KLAPPER, I.

“Microrheology Techniques Applicable to Soft Biological Materials,” BRIN, PI: I. Klapper, \$3,000, (2005).

LUEBECK, J.

“Effects of Instructor Interventions and Online Mentoring,” BEST Award, \$4,500, (2005).

WALKER, R.

“Secrets of the Infinite,” MSU Core Curriculum Reform, PI: R. Walker, co-PI: J. Tucker, \$5000, (2005).