

◀ MATHEMATICAL SCIENCES ▶

HIGHLIGHTS

- ◇ UNDERGRADUATE MAJOR MARKUS HYBNER RECEIVED AN AWARD FOR EXCELLENCE AND BENJAMIN BARTLE WAS ELECTED TO MORTAR BOARD.
- ◇ GRADUATE STUDENT JEROME TROUBA WAS SELECTED AS THE OUTSTANDING GRADUATE TEACHING ASSISTANT IN THE COLLEGE OF LETTERS OF SCIENCE.
- ◇ PROFESSOR JOHN LUND RECEIVED AN AWARD FOR EXCELLENCE.
- ◇ PROFESSOR MARK PERNAROWSKI WAS THE COLLEGE OF LETTERS AND SCIENCE OUTSTANDING TEACHER.
- ◇ PROFESSOR JOHN BORKOWSKI WAS ONE OF FOUR INAUGURAL COLLEGE OF LETTERS AND SCIENCE DISTINGUISHED PROFESSORS.
- ◇ OF 128 UNDERGRADUATE MAJORS, 5 WERE PRESIDENTIAL SCHOLARS AND 20 WERE IN THE HONORS PROGRAM.

Books	4
Technical Manuscripts	8
Refereed Articles	62
Presentations	72
FTE Faculty	27.1
Majors	247
Grant Expenditures	\$406,454

SUMMARY

TEACHING

The Department of Mathematical Sciences delivered about 10% of the total student credit hours at MSU last year. We have 128 undergraduate majors seeking a B.S. degree in one of four options (Applied Mathematics, Mathematics, Mathematics Teaching, Statistics). In addition we have 86 M.S. students and 33 Ph.D. candidates. In 2006, the department awarded 27 Bachelor of Science degrees. Among these B.S. degrees were 4 who graduated with highest honors, seven who graduated with honors, and one who completed the University Honors Program. Also awarded in 2006 were 21 Master of Science degrees, three Doctor of Philosophy degrees, and one Doctor of Education degree.

Our students have received several awards this year. Benjamin Bartle, Matthew Beamer, Kevin Rice, Kori Smith, and Matthew Welch were Presidential Scholars. Tess Ritter was a Provost Scholar. Benjamin Bartle was selected as a member of Mortar Board. Markus Hybner received a Bozeman Area Chamber of Commerce and MSU Alumni Association Award for Excellence.

Jerome Trouba was honored as the Outstanding GTA in the College of Letters of Science, the fourth year in a row that this award went to a GTA in our department. Shane Nowack and Cindi Van Deventer were departmental Outstanding GTAs. Professor John Lund received the Bozeman Area Chamber of Commerce and MSU Alumni Association Award for Excellence. Professor Mark Pernarowski was recognized as the College of Letters and Science Outstanding Teacher.

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 Big Sky Institute (BSI), the State of Montana Fish, Wildlife, & Parks Service, the US Geological Survey (USGS), Yellowstone National Park, and the Western Transportation Institute (WTI). Cooperative on-campus projects involved the departments of Agricultural Economics & Economics, 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. Marcy Barge spoke at the Generalized Substitutions, Tilings, and Numeration Conference in Marseille, France as well as at Delft University in Delft, Netherlands. John Borkowski was a Visiting Professor of Statistics in the Department of Mathematics and Statistics at Thammasat University in Bangkok, Thailand and gave addresses at the 2006 Conference on Applied Statistics in Pattaya Cholburee, Thailand; ICAQM 2006 in Taipei, Taiwan; Kasetsart University, Thailand; and Chiang Mai University, Thailand. Jack Dockery gave talks in Kyoto, Japan and Malmo University, Sweden. Tomas Gedeon spoke at the AIMS Annual Conference in Poitiers, France. Isaac Klapper spoke at Malmo University, in Malmo, Sweden; Exeter University in the United Kingdom; and the Nordita/Neils Bohr Institute for Physics in Copenhagen, Denmark. Jarek Kwapisz spoke at the Mathematics of Fractals Conference at Kyoto University, Kyoto, Japan. Of more local interest, Steve Cherry continued a funded research project with the US Geological Survey concerning wildlife habitat in and around Yellowstone National Park. John Borkowski and Steve Cherry both have separate funded projects with the National Park Service involving habitat studies in Yellowstone. The last two of the four books in the Navigations Series for the National Council of Teachers of Mathematics were edited by Maurice Burke and appeared in print this year.

Steve Cherry is a member of the Interagency Grizzly Bear Study Team, the Northern Yellowstone Carnivore Working Group, and the Whitebark Pine Monitoring Working Group. Tomas Gedeon worked on the five-year, \$18,000,000 INBRE grant, involved with bioinformatics; continued work on a \$599,634 National Science Foundation grant on optimal sensor receptor arrays; and completed a \$157,263 NSF/NIH grant to study NCR-circuit dynamics. 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 continued her work on a large Air Force funded project concerning advanced guidance systems. Linda Simonsen continued work on the Big Sky Institute GK-12 project, a \$1,768,000 NSF grant. Curt Vogel was funded by NSF on a project involving adaptive optics scanning laser ophthalmoscopy and The Optical Sciences Company on a project involving thirty meter telescopes.

This year, Tomas Gedeon's Ph.D. student, Christina Hayes, finished her degree and is now teaching at Gettysburg College in Gettysburg, Pennsylvania. Lisa Davis directed a team involving postdocs, Faranak Pahlevani and John Singler, and graduate student, Jennifer Thorenson, that investigated unmanned air vehicles. Tomas Gedeon worked with graduate students Bree Cummins, Shaun Harker, and Kate Rardin on computational neuroscience. Jon Hasenbank completed his Ph.D. under Ted Hodgson and took a faculty position at the University of Wisconsin-LaCrosse in LaCrosse, Wisconsin. Isaac Klapper's Ph.D. student, Barbara Szomolay, finished her degree and received a postdoctoral appointment at the Ohio State University. 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. Steve Cherry served on the General Education Council for the

Commissioner of Higher Education. Warren Esty is on the Mathematics Higher Education Transfer Steering Committee, convened by the Commissioner of Higher Education and the P-20 Assessment Task Force, convened by the Montana Board of Regents. For the Montana Chapter of the American Statistical Association, Sherry Heis was the Secretary/Treasurer, Mark Greenwood was the 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. Linda Simonsen served on the Fellow Selection Committee for both the Big Sky Institute for Science and Natural History and the Center for Learning and Teaching in the West.

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. 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*. 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 Number and Operation in Grades 9-12, edited by M. Burke, P. Kehle, P. Kennedy, and D. St. John, National Council of Teachers of Mathematics, Reston, Virginia, 171 pages, (2006).

Navigating Through Mathematical Connections in Grades 9-12, edited by M. Burke, T. Hodgson, P. Kehle, P. Mara, and F. Resek, National Council of Teachers of Mathematics, Reston, Virginia, 178 pages, (2006).

ESTY, W.

Proof: An Introduction to Higher Mathematics, W. Esty and N.C. Esty, 336 pages, (2006).

HODGSON, T.

Navigating Through Mathematical Connections in Grades 9-12, edited by M. Burke, T. Hodgson, P. Kehle, P. Mara, and F. Resek, National Council of Teachers of Mathematics, Reston, Virginia, 178 pages, (2006).

B. TECHNICAL MANUSCRIPTS

BAKER, A.

“Analysis of Biological Interaction Networks for Drug Discovery,” A. Baker, M. Jung, C. Lee, I. Maslova, M. Morton, J. Wang, in A. Chertock, M. Haider, M. Olufson, and R. Smith (Eds.) *Twelfth Industrial Mathematical and Statistical Modeling Workshop for Graduate Students*, 119-157 (2006).

BOIK, R.

Notes for Multivariate Analysis I, R. Boik, Department of Mathematical Sciences, Montana State University, Bozeman, Montana, (2006).

Notes for Advanced Mathematical Statistics, R. Boik, Department of Mathematical Sciences, Montana State University, Bozeman, Montana, (2006).

BORKOWSKI, J.

“Evaluating Wildlife Responses to Winter Human Use in Yellowstone National Park: Statistical Analyses of Four Years of Winter-Use Wildlife Road Survey Data the Bison, Trumpeter Swan, Bald Eagle, and Coyote December,” J. Borkowski, *Yellowstone Center for Resources Report*, Yellowstone National Park, Mammoth, Wyoming, (2006).

CHERRY, S.

“Monitoring Whitebark Pine in the Greater Yellowstone Ecosystem,” S. Cherry, in C. Schwartz, M. Haroldson, and K. West (Eds), *Yellowstone Grizzly Bear Investigations: 2005 Annual Report of the Interagency Grizzly Bear Study Team*, U.S. Geological Survey, Bozeman, Montana, 73-80, (2006).

“Reassessing Methods to Estimate Population Size and Sustainable Mortality Limits for the Yellowstone Grizzly Bear: Workshop Supplement,” S. Cherry, (2006).

“Monitoring Ungulate Carcasses and Spawning Cutthroat Trout,” S. Cherry, *Report to the Interagency Grizzly Bear Study Team*, (2006).

ROBINSON-COX, J.

“Detecting Yield-Switching Fraud in Crop Insurance Records,” J. Robinson-Cox and J. Atwood, *MSU Dept. of Mathematical Sciences Tech Report*, 1-12, (2006).

C. REFEREED JOURNAL ARTICLES

BAKER, V.

“Geometric Realization and Coincidence for Reducible Non-Unimodular Pisot Tiling Spaces with an Application to Beta-Shifts,” V. Baker, M. Barge, and J. Kwapisz, *Annales de l'Institut Fourier*, 56, 2213-2248, (2006).

BANFIELD, J.

“The Importance of Considering Prediction Variance in Analyses Using Photogrammetric Mass Estimates,” K. Proffitt, R. Garrott, J. Rotella, and J. Banfield, *Marine Mammal Science*, 23, 65-76, (2006).

BARGE, M.

“Geometric theory of Unimodular Pisot Substitutions,” J. Kwapisz and M. Barge, *American Journal of Mathematics*, 128, 1219-1282, (2006).

“Hyperbolic Pseudo-Anosov Maps a.e. Embed into a Toral Automorphism,” J. Kwapisz and M. Barge, *Ergodic Theory and Dynamical Systems*, 26, 961-972, (2006).

“Geometric Realization and Coincidence for Reducible Non-Unimodular Pisot Tiling Spaces with an Application to Beta-Shifts,” V. Baker, M. Barge, and J. Kwapisz, *Annales de l'Institut Fourier*, 56, 2213-2248, (2006).

BOIK, R.

“Second-Order Accurate Inference on Simple, Partial, and Multiple Correlations,” R. Boik and B. Haaland, *Journal of Modern Applied Statistical Methods*, 5, 283-308, (2006).

“Indirect Effects of Herbicides on Bird Food Resources and Beneficial Arthropods,” R. Taylor, B. Maxwell, and R. Boik, *Agriculture, Ecosystems and Environment*, 116, 154-157, (2006).

BORKOWSKI, J.

“Graphical Methods for Assessing the Prediction Capability of Response Surface Designs,” *Response Surface Methodology and Related Topics*, 349-378, (2006).

“An Alternative Approach to Sizing Apparel for Women 55 and Older,” C. Salusso, J. Borkowski, N. Reich, and E. Goldsberry, *Clothing and Textiles Research Journal*, 24, 96-111, (2006).

“Integrated Management of Leafy Spurge-Infested Rangeland,” J. Jacobs, R. Sheley, and J. Borkowski, *Rangeland Ecology & Management*, 59, 475-482, (2006).

“Wildlife Responses to Motorized Winter Recreation in Yellowstone National Park,” J. Borkowski, P. White, R. Garrott, T. Davis, A. Hardy, and R. Reinhart, *Ecological Applications*, 16, 1911-1925, (2006).

“Weighted Design Optimality Criteria for Spherical Response Surface Designs,” Chomtee, Boonorm, and J. Borkowski, *KMITL Science Journal*, 5, 226-238, (2006).

“Temporal Variability in Winter Use Patterns of Yellowstone Bison: The Effects of Road Grooming,” J.E. Bruggeman, R. Garrott, D. Bjornlie, P. White, F. Watson, and J. Borkowski, *Ecological Applications*, 16, 1539-1554, (2006).

“Assessment of Prey Vulnerability Through Analysis of Wolf Movements and Kill Sites,” E. Bergman, R. Garrott, S. Creel, J. Borkowski, and R. Jaffe, *Ecological Applications*, 16, 273-284, (2006).

“Prey Risk Allocation in a Grazing Ecosystem,” J. Gude, R. Garrott, J. Borkowski, and F. King, *Ecological Applications*, 16, 285-298, (2006).

CHERRY, S.

“Temporal, Spatial and Environmental Influences on the Demographic of Grizzly Bears in the Greater Yellowstone Ecosystem,” C. Schwartz, M. Haroldson, G. White, R. Harris, S. Cherry, K. Keating, D. Moody, and C. Servheen, *Wildlife Monographs*, 161, 68 pages, (2006).

DOCKERY, J.

“Bifurcations and Attractors for a Controlled Burgers Equation,” J. Dockery, D. Gilliam, and C. Byrnes, *Proceedings of MTNS*, 74, (2006).

“Role of Cohesion in Material Description of Biofilms,” I. Klapper and J. Dockery, *Physical Review E*, 74-031902:1-8, (2006).

ESTY, W.

“How to Estimate the Original Number of Dies and the Coverage of a Sample,” W. Esty, *Numismatic Chronicle*, 359-364, (2006).

GEDEON, T.

“Effects of Stimulus Transformations on Estimates of Sensory Neuron Functions,” A. Dimitrov and T. Gedeon, *Journal of Computational Neuroscience*, 20, 265-283, (2006).

“The Conley Index for Fast-Slow Systems II,” T. Gedeon, H. Kokubu, K. Mischaikow, and H. Oka, *Journal of Differential Equations*, 225, 242-307, (2006).

“Singular Boundary Value Problems via the Conley Index,” T. Gedeon and K. Mischaikow, *Topological Methods in Nonlinear Analysis*, 28, 263-284, (2006).

GREENWOOD, M.

“Predictive Discrepancy Using Full Cross-Validation for Regression Models,” M. Greenwood, *Proceedings of the American Statistical Association*, 2043-2050, (2006).

HAALAND, B.

“Second-Order Accurate Inference on Simple, Partial, and Multiple Correlations,” R. Boik and B. Haaland, *Journal of Modern Applied Statistical Methods*, 5, 283-308, (2006).

HAMILTON, M.

“Modification of the AOAC Sporidical Activity of Disinfectants Test (Method 966.04): Collaborative Study,” S. Tomasino and M. Hamilton, *Journal of AOAC International*, 89(5), 1373-1397, (2006).

HODGSON, T.

“It’s About Time: Understanding Einstein’s Relativity,” T. Hodgson, *Mathematics Teacher*, 100, 158-159, (2006).

“On the Use of Client-Driven Projects in the Mathematics Classroom,” D. Maki, W. Winston, M. Shafii-Mousavi, P. Kochanowski, C. Lang, K. Ernstberger, and T. Hodgson, *PRIMUS*, 16, 300-313, (2006).

“Pathways to Success in Pre-College Mathematics,” B. Madsen, T. Hodgson, and C. Ward, *Tribal College Journal*, 18, 28-30, (2006).

“Applets and Algebra in the Middle Grades,” T. Hodgson, http://my.nctm.org/eresources/view_article.asp?article_id=7437, *On-Math*, 4(1), 1-6, (2006).

“Hands-On Perspective,” T. Hodgson, M. Frantz, A. Crannell, and D. Maki, *Mathematics Teacher*, 99, 554-559, (2006).

“Applets, Functions, and a Dynamic Understanding of Calculus,” T. Hodgson, D. Schultz, and D. Heath, http://my.nctm.org/eresources/view_article.asp?article_id=7557, *On-Math*, 4(1), 1-7, (2006).

KLAPPER, I.

“Role of Cohesion in Material Description of Biofilms,” I. Klapper and J. Dockery, *Physical Review E*, 74-031902:1-8, (2006).

KWAPISZ, J.

“Geometric Theory of Unimodular Pisot Substitutions,” J. Kwapisz and M. Barge, *American Journal of Mathematics*, 128, 1219-1282, (2006).

“Hyperbolic Pseudo-Anosov Maps a.e. Embed into a Toral Automorphism,” J. Kwapisz and M. Barge, *Ergodic Theory and Dynamical Systems*, 26, 961-972, (2006).

“A Dynamical Proof of Pisot,” J. Kwapisz, *Canadian Mathematical Bulletin*, 49, 108-112, (2006).

“Geometric Realization and Coincidence for Reducible Non-Unimodular Pisot Tiling Spaces with an Application to Beta-Shifts,” V. Baker, M. Barge, and J. Kwapisz, *Annales de l’Institut Fourier*, 56, 2213-2248, (2006).

LUEBECK, J.

“Linking Teachers Online: A Structured Approach to Computer-Mediated Mentoring for Beginning Mathematics Teachers,” J. Luebeck, chapter in the monograph *The Work of Mathematics Teacher Educators: Continuing the Conversation*, Association of Mathematics Teacher Educators, San Diego, California, 79-95, (2006).

“Meeting in the Middle: Grades 6-8 Mathematics for Elementary and Secondary Majors,” J. Luebeck, chapter in the monograph *Preparing Future Science and Mathematics*

Teachers, Association of Mathematics Teacher Educators, San Diego, California, 17-19, (2006).

“When One Shot is All You’ve Got—Bringing Quality Professionalism Development to Rural Mathematics Teachers,” J. Luebeck, *Journal of Mathematics Education Leadership*, 9, 34-41, (2006).

PARKER, A.

“Applications for Eye-Motion-Corrected Adaptive Optics Scanning Laser Ophthalmoscope Videos,” A. Roorda, E. Rossi, Y. Zhang, S. Stevenson, D. Arathorn, C. Vogel, A. Parker, and Q. Yang, *Investigative Ophthalmology and Visual Science*, 47, (2006).

“Retinal Motion Estimation and Image Dewarping in Adaptive Optics Scanning Laser Ophthalmoscopy,” C. Vogel, D. Arathorn, A. Roorda, and A. Parker, *Optics Express*, 14, 487-497, (2006).

PERNAROWSKI, M.

“Return Map Characterizations for a Model of Bursting with Two Slow Variables,” M. Pernarowski, and R. Griffiths, *SIAM Journal of Applied Mathematics*, 66, 1917-1948, (2006).

ROBINSON-COX, J.

“Mycobacterium Tuberculosis Binding to Human Surfactant Proteins A and D, Fibronectin and Small Airway Epithelial Cells Under Shear,” L. Hall-Stoodley, G. Watts, J. Crowther, J. Robinson-Cox, R. Bargatze, A. Harmsen, and L. Schlesinger, *Infection and Immunology*, 74, 3587-3596, (2006).

“Estimating the Prevalence and Cost of Yield-Switching Fraud in the Federal Crop Insurance Program,” J. Atwood, J. Robinson-Cox, and S. Shaik, *American Journal of Agricultural Economics*, 88:(2), 365-381, (2006).

SHARP, J.L.

“Inferring Protein Associations Using Protein Pulldown Assays,” J. L. Sharp, K. K. Anderson, D. S. Daly, D. L. Auberry, J. J. Borkowski, and W. R. Cannon, 2006 *Proceedings of the American Statistical Association, Biometrics Section* [CD-ROM], (2006).

VOGEL, C.

“Fast Optimal Wavefront Reconstruction for Multi-Conjugate Adaptive Optics Using the Fourier Domain Preconditioned Conjugate Gradient Algorithm,” C.

Vogel and Q. Yang, *Optics Express*, 14, 7487-7498, (2006).

“Time-Varying Stochastic Turbulence Model,” C. Vogel, *International Society for Optical Engineering*, 6272-112, (2006).

“Fourier Domain Algorithm for the Fitting Step in Multi-Conjugate Adaptive Optics,” Q. Yang and C. Vogel, *International Society for Optical Engineering*, 6272-101, (2006).

“Multigrid Algorithm for Least Squares Wavefront Reconstruction,” C. Vogel and Q. Yang, *Applied Optics*, 45, 705-715, (2006).

“Modeling and Simulation of a Continuous Facesheet MEMS Deformable Mirror,” C. Vogel and Q. Yang, *Journal of the Optical Society of America A*, 23, 1074-1081, (2006).

“Applications for Eye-Motion-Corrected Adaptive Optics Scanning Laser Ophthalmoscope Videos,” A. Roorda, E. Rossi, Y. Zhang, S. Stevenson, D. Arathorn, C. Vogel, A. Parker, and Q. Yang, *Investigative Ophthalmology and Visual Science*, 47, (2006).

“Fourier Domain Preconditioned Conjugate Gradient Algorithm for Atmospheric Tomography,” Q. Yang, C. Vogel, and B. Ellerbroek, *Applied Optics*, 45, 5281-5293, (2006).

“Modeling and Open-Loop Control of Point-Actuated, Continuous Facesheet Deformable Mirrors,” C. Vogel and Q. Yang, *International Society for Optical Engineering*, 6272-73, (2006).

“Retinal Motion Estimation and Image Dewarping in Adaptive Optics Scanning Laser Ophthalmoscopy,” C. Vogel, D. Arathorn, A. Roorda, and A. Parker, *Optics Express*, 14, 487-497, (2006).

WELDER, R.

“Prerequisite Knowledge for the Learning of Algebra,” R. Welder, *Proceedings of the Fifth Annual Hawaii International Conference on Statistics, Mathematics and Related Fields*, 1642-1667, (2006).

YANG, Q.

“Fast Optimal Wavefront Reconstruction for Multi-Conjugate Adaptive Optics Using the Fourier Domain Preconditioned Conjugate Gradient Algorithm,” C. Vogel and Q. Yang, *Optics Express*, 14, 7487-7498, (2006).

“Fourier Domain Algorithm for the Fitting Step in Multi-Conjugate Adaptive Optics,” Q. Yang and C. Vogel, *International Society for Optical Engineering*, 6272-101, (2006).

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“Modeling and Simulation of a Continuous Facesheet MEMS Deformable Mirror,” C. Vogel and Q. Yang, *Journal of the Optical Society of America A*, 23, 1074-1081, (2006).

“Applications for Eye-Motion-Corrected Adaptive Optics Scanning Laser Ophthalmoscope Videos,” A. Roorda, E. Rossi, Y. Zhang, S. Stevenson, D. Arathorn, C. Vogel, A. Parker, and Q. Yang, *Investigative Ophthalmology and Visual Science*, 47, (2006).

“Fourier Domain Preconditioned Conjugate Gradient Algorithm for Atmospheric Tomography,” Q. Yang, C. Vogel, and B. Ellerbroek, *Applied Optics*, 45, 5281-5293, (2006).

“Modeling and Open-Loop Control of Point-Actuated, Continuous Facesheet Deformable Mirrors,” C. Vogel and Q. Yang, *International Society for Optical Engineering*, 6272-73, (2006).

PRESENTATIONS

BARGE, M.

“Geometric Realization of Pisot Spaces,” Generalized Substitutions, Tilings, and Numeration Conference, Marseille, France, March 2006.

“The Coincidence Conjecture,” Delft University of Technology, Delft, Netherlands, March 2006.

BORKOWSKI, J.

“Industrial Applications of Response Surface Designs,” 2006 Conference on Applied Statistics, Pattaya Cholburee, Thailand, May 2006.

“Career Opportunities in Statistics,” 2006 Conference on Applied Statistics, Pattaya Cholburee, Thailand, May 2006.

“Space Filling Designs for High-Dimensional Mixture Experiments with Multiple Component Constraints,”

International Chinese Association of Quantitative Management (ICAQM) 2006 Conference, Taipei, Taiwan, June 2006.

“Space Filling Designs for High-Dimensional Mixture Experiments with Multiple Component Constraints,” Kasetsart University, Bangkok, Thailand, June 2006.

“Simple Latin Square Sampling $\pm k$ Designs,” Kasetsart University, Bangkok, Thailand, June 2006.

“Space Filling Designs for High-Dimensional Mixture Experiments with Multiple Component Constraints,” Chiang Mai University, Chiang Mai, Thailand, June 2006.

“Simple Latin Square Sampling $\pm k$ Designs,” Chiang Mai University, Chiang Mai, Thailand, June 2006.

“Space Filling Designs for High-Dimensional Mixture Experiments with Multiple Component Constraints,” Thammasat University, Bangkok, Thailand, Sept. 2006.

“Simple Latin Square Sampling $\pm k$ Designs,” Thammasat University, Bangkok, Thailand, September 2006.

“A Comparison of Prediction Variance Criteria for Response Surface Designs,” Thammasat University, Bangkok, Thailand, September 2006.

“Randomizing Run Order Without Resetting Factors,” Thammasat University, Bangkok, Thailand, September 2006.

“Statistics and Public Perception,” Montana State University Distinguished Professor Lecture, Bozeman, Montana, November 2006.

BURKE, M.

“Computer Algebra Opens Another Door,” Regional Conference of Teachers Teaching with Technology, Helena, Montana, March 2006.

CHERRY, S.

“Monitoring Whitebark Pine in the Greater Yellowstone Ecosystem,” with C.C. Schwartz, G.A. Denitto, E. Davy, M. Jenkins, E. Shanahan, D.P. Reinhart, R.E. Bennetts and M. Maj, U.S. Forest Service Meeting on Forest Health Management, Presenter: G. Dinitto, January 2006.

DAVIS, L.

“Sensitivity Analysis and Control Systems Governed by

Partial Differential Equations,” AMS-MAA Joint Mathematics Meetings, San Antonio, Texas, January 2006.

“The Continuous Sensitivity Equation Method and Some of its Applications,” Mechanical Engineering Departmental Seminar, Oregon State University, Corvallis, Oregon, April 2006.

“Sensitivity Analysis and Control for Systems Governed by Partial Differential Equations,” SIAM Annual Meeting, Boston, Massachusetts, July 2006.

DOCKERY, J.

“Mathematical Modeling of Biofilms,” Montana State University Center for Biofilm Engineering, Bozeman, Montana, April 2006.

“Bifurcations and Attractors for a Controlled Burgers Equation,” with D. Gilliam and C.I. Byrnes, Mathematical Theory of Networks and Systems (MTNS) Conference, Kyoto, Japan, July 2006.

“Opponent for Erik Alpkvist, PhD Candidate at Lund University,” Malmo University, Malmo, Sweden, December 2006.

“Explaining Bacterial Persistence with Senescence,” with B. Ayati, T. Gedeon, P. Gilbert, I. Klapper and P. Stewart, Malmo University, Malmo, Sweden, December 2006.

ESTY, W.

“Towards Cryptography,” Presentation for COMET, Canyon Ferry, Montana, July 2006.

“Explaining Variables and Their Uses,” Montana Education Association/Montana Federation of Teachers Educators’ Conference, Billings, Montana, October 2006.

GEDEON, T.

“Models of Gene Regulation,” Defense Advanced Research Projects Agency (DARPA) Meeting, Rutgers University, New Jersey, March 2006.

“Dynamics of a Simple Genetic Switch,” University of Minnesota Applied Math Seminar, Minneapolis/St. Paul, Minnesota, April 2006.

“Dynamics of a Simple Genetic Switch,” Colloquium, University of Montana, Missoula, Montana, April 2006.

“Dynamics of a Simple Genetic Switch,” AIMS Annual Conference, Poitiers, France, June 2006.

“Modeling Cercus-Air Interaction,” Rutgers University Applied Math Seminar, New Jersey, October 2006.

GREENWOOD, M.

“Predictive Discrepancy Using Full Cross-Validation for Regression Models,” Joint Statistical Meetings, Seattle, Washington, August 2006.

“Functional Clustering by Shape of Elevation Profiles,” New Researchers in Probability and Statistics, Seattle, Washington, August 2006.

“A Comparison of FCV and CV Based Measures for Model Selection,” Annual Meeting of the Montana Section of the American Statistical Association, Butte, Montana, September 2006.

“Apparent Shift in Time of Spring Runoff due to Annual Discharge Variability in the Headwaters of the Columbia-Missouri Rivers,” American Geophysical Union Fall Meeting, San Francisco, California, December 2006.

HAMILTON, M.

“Statistics in Biofilm Research,” Montana State University Center for Biofilm Engineering Workshop, Bozeman, Montana, February 2006.

“Drip Flow Biofilm Reactor,” Montana State University Center for Biofilm Engineering Technical Advisory Conference, Bozeman, Montana, February 2006.

“Standardizing a Biofilm Method for Routine Use,” Montana State University Center for Biofilm Engineering Workshop, Bozeman, Montana, June 2006.

“Log Reduction Calculations,” Montana State University Center for Biofilm Engineering Technical Advisory Conference, Bozeman, Montana, June 2006.

HODGSON, T.

“On the Learning of Procedures with Understanding,” Indiana University-Purdue University Indianapolis Mathematics Colloquium, Indianapolis, Indiana, February 2006.

“Modeling in the Middle Grades,” Indiana Mathematics Initiative Workshop for Teachers in Grades 5-8, Terre Haute, Indiana, February 2006.

“Activities that Integrate Mathematics and Art,” 2006 Annual Meeting of the National Council of Teachers of Mathematics, St. Louis, Missouri, April 2006.

“On the Learning of Algebra: A Tale of Two Studies,” Kentucky Centre for Mathematics Education, Highland Heights, Kentucky, June 2006.

KLAPPER, I.

“Physical Description of Biofilms,” Biofilm Group Seminar, Malmo University, Malmo, Sweden, Jan. 2006.

“Biofilms as Materials,” Applied Mathematics Seminar, Department of Mathematics, Exeter University, Exeter, United Kingdom, February 2006.

“Biofilms as Materials,” Biocomplexity Seminar, Nordita/Neils Bohr Institute for Physics, Copenhagen, Denmark, February 2006.

“Biofilms as Fluids,” Workshop on Microfluidic Flows in Nature and Microfluidic Technologies, Institute for Pure and Applied Mathematics, University of California at Los Angeles, Los Angeles, California, April 2006.

“Large Jump Asymptotics for Computations with Highly Discontinuous Coefficients,” Level Set Collective, Department of Mathematics, University of California at Los Angeles, Los Angeles, California, April 2006.

“A Physical View of Biofilm Structure,” Mathematics Department Colloquium, University of Wyoming, Laramie, Wyoming, October 2006.

“A Physical View of Biofilm Structure,” Colloquium, Mathematical Biology Institute, Ohio State University, Columbus, Ohio, November 2006.

KWAPISZ, J.

“Geometric Coincidence Conjecture for Pisot Substitutions,” Ergodic Theory and Statistical Mechanics Seminar, Princeton University, Princeton, New Jersey, April 2006.

“Geometric Coincidence: The Condition and the Conjecture,” Mathematics of Fractals Conference, Kyoto, Japan, September 2006.

LUEBECK, J.

“Linking Teachers Online: Computer-Mediated Mentoring in Mathematics,” Association of

Mathematics Teacher Educators Annual Conference, Tampa, Florida, January, 2006.

“Changing Math in Montana: Reaching and Reflecting with Rural Teachers,” School Science and Mathematics Association Annual Conference, Missoula, Montana, October 2006.

PERNAROWSKI, M.

“Map Characterizations of a Model of Bursting Exhibiting Bistability,” Origin and Regulation of Bursting Activity in Neurons, Georgia State University, Atlanta, Georgia, April 2006.

SHARP, J.L.

“Inferring Protein-Protein Associations Using Pull-down Assay Experiments,” Clemson University, Clemson, South Carolina, November, 2006.

“Statistical Analyses for Inferring Protein-Protein Associations Using Pull-down Assay Experiments.” The CNA Corporation, Alexandria, Virginia, November, 2006.

“Classifying Proteins from Pull-down Assays While Controlling the False Discovery Rate,” Montana Chapter of the American Statistical Association Meetings, Butte, Montana, September, 2006.

“Inferring Protein Associations Using Protein Pulldown Assays,” Joint Statistical Meetings, Seattle, Washington, August, 2006.

“Computational Approaches for Aggregating and Scoring Protein-Protein Interaction Data.” Genomes to Life Contractor-Grantee Workshop IV, North Bethesda, Maryland, February, 2006.

VOGEL, C.

“Real-Time Controller Feasibility Study for the Thirty Meter Telescope Project,” Optical Sciences Company, Anaheim, California, January 2006.

“Code Development for the Real-Time Controller Feasibility Study for the Thirty Meter Telescope Project,” California Institute of Technology, Anaheim, California, January 2006.

“Retinal Stimulus Delivery Project,” University of California at Berkeley, Berkeley, California, January 2006.

“Data Driven Modeling and Analysis,” Meeting for the

Radiographic Data Analysis Project, Oak Park, Illinois, January 2006.

“Real-Time Controller Feasibility Study for the Thirty Meter Telescope Project,” Optical Sciences Company, Anaheim, California, February 2006.

“MEMS Device Modeling and Control,” ECE Department Colloquium, University of California Santa Cruz, Santa Cruz, California, February 2006.

“Real-Time Controller Feasibility Study for the Thirty Meter Telescope Project,” Optical Sciences Company, Anaheim, California, March 2006.

“Code Development for the Real-Time Controller Feasibility Study for the Thirty Meter Telescope Project,” California Institute of Technology, Anaheim, California, March 2006.

“Real-Time Controller Feasibility Study for the Thirty Meter Telescope Project,” Optical Sciences Company, Anaheim, California, April 2006.

“Modeling and Open-Loop Control of Point-Actuated, Continued Facesheet Deformable Mirrors,” International Society for Optical Engineering Conference on Astronomical Telescopes and Instrumentation, Orlando, Florida, May 2006.

“Fourier Domain Algorithm for the Fitting Step in Multi-Conjugate Adaptive Optics,” International Society for Optical Engineering Conference on Astronomical Telescopes and Instrumentation, Orlando, Florida, May 2006.

“Time-Varying Stochastic Turbulence Model,” International Society for Optical Engineering Conference on Astronomical Telescopes and Instrumentation, Orlando, Florida, May 2006.

WELDER, R.

“Prerequisite Knowledge for the Learning of Algebra,” Fifth Annual Hawaii International Conference on Statistics, Mathematics and Related Fields, Honolulu, Hawaii, January 2006.

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.

“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, 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. Michairow, 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).

HODGSON, T.

“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).

“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).

“Gallatin to Glacier: Middle Grades Mathematics/G2G,” U.S. Department of Education, PI: J. Luebeck, co-PI: J. Howard and T. Hodgson, \$332,000 (2006-2008).

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).

“One-Year Continuation of Creating Opportunities in Mathematics Education for Teachers/COMET,” U.S. Department of Education, PI: J. Luebeck, co-PI: J. Howard, \$75,000, (2006-2007).

“Gallatin to Glacier: Middle Grades Mathematics/G2G,” U.S. Department of Education, PI: J. Luebeck, co-PI: J. Howard and T. Hodgson, \$332,000, (2006-2008).

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).

VOGEL, C.

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

“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,” The Optical Sciences Company (TOSC), \$35,000, (2005-2006).

B. FUNDED INTERNAL GRANTS

BARGE, M.

“Travel to Delft,” Short-Term Professional Development Leave, PI: M. Barge, \$2,900, (2006).

“Travel to Delft,” L&S Research Enhancement, PI: M. Barge, \$3,000, (2006).

BORKOWSKI, J.

“Conducting Collaborative Research with Statistics Faculty at Kasetsart University and Silpakorn University in Thailand,” Short-Term Professional Development Leave, PI: J. Borkowski, \$3,600, (2006).

“Proposal for Establishing Collaborative Research with Faculty and Doctoral Students at Thammasat University in Thailand to Enhance Recruitment of Doctoral Students for MSU’s Doctoral Program,” MSU Faculty International Research and Development Program, PI: J. Borkowski, \$1,500, (2006).

SIMONSEN, L.

“Content in Online Mathematical Discourse,” BEST Award, \$7,000, (2006).