

Matthew Herman

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Department of Mathematics
University of California, Davis
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EDUCATION

- Ph.D. Applied Mathematics**, University of California, Davis Completed Sept. 2009
Topics: Compressed sensing, sparse representations, harmonic analysis (Conferred Dec. 2009)
- Additional graduate work, San Francisco State University Sept. 2002 – May 2005
Topics: Wavelets, frame theory, quantization error
- M.S. Electrical Engineering**, State University of New York at Buffalo February 1997
Topics: Telecommunications and signal processing
- B.S. Engineering Physics** State University of New York at Buffalo September 1995
Mathematics minor

PUBLICATIONS

- M. Herman and T. Strohmer, "High-Resolution Radar via Compressed Sensing"
IEEE Transactions on Signal Processing, Vol. 57, No. 6, pp. 2275-2284, June 2009.
- M. Herman and T. Strohmer, "General Deviants: An Analysis of Perturbations in Compressed Sensing"
IEEE Selected Topics in Signal Processing: Special Issue on Compressive Sensing (to appear)

SELECTED CONFERENCE PROCEEDINGS AND PRESENTATIONS

- with T. Strohmer, "General Perturbations of Sparse Signals in Compressed Sensing" (Paper and talk)
Proc. Conference on Sampling Theory and Applications (SampTA)
Marseille, France, May 2009
- with T. Strohmer, "Compressed Sensing Radar" (Paper and talk)
Proc. IEEE International Conference on Acoustic, Speech, and Signal Processing (ICASSP)
Las Vegas, NV, April 2008
- "High-Resolution Radar via Compressed Sensing" (Poster)
2008 February Fourier Talks
Norbert Wiener Center, University of Maryland, February 2008
- "Identifying Linear Time-Varying Systems via Compressed Sensing" (Talk)
2007 von Neumann Symposium on Sparse Representation and High-Dimensional Geometry
Snowbird, UT, July 2007
- with S. Li, "Biorthog. Wavelets of Max. Coding Gain via Pseudoframes for Subspaces" (Paper and talk)
Proc. SPIE: Mathematics of Data/Image Pattern Recognition, Compression, Encryption w. Applications
San Diego, CA, August 2006

RESEARCH EXPERIENCE

- Doctoral Research**, UC Davis Jan. 2007 – present
- Researched compressed sensing and sparse representations for radar and other time-varying systems
 - Developed a general compressed sensing perturbation model (**multiplicative** as well as **additive noise**)
 - Programmed computer simulations in Matlab; optimized code to handle large-scale data
- Graduate Research**, San Francisco State University Jan. 2004 – May 2005
- Researched quantization error of biorthogonal wavelets using technique of pseudoframes for subspaces
 - Discovered condition necessary to maximize the coding gain for a certain statistical class of signal
- Research Assistant**, SUNY Buffalo, Dept. of Elect. & Comp. Eng. Sept. 1994 – Sept. 1995
- Assisted in the design of a high-speed digital radio for use in commercial applications
 - Programmed computer simulations in Matlab and Acolade gauging the effects of Partial-Response Continuous Phase Modulation on out-of-band radiation (in accordance with FCC/ETSI specs)

ELECTRICAL ENGINEERING EXPERIENCE

- Software Engineer**, Harris Corporation (Redwood Shores, CA) Sept. 1999 – July 2001
- Expanded a complex, mission-critical engineering tool that designed wireless communications systems
 - Involved in all phases of software development including design, coding, QA, rollout and support
- Systems Design and Transmission Engineer**, Harris Corporation Jan. 1998 – Sept. 1999
- Conducted transmission studies to determine ideal environments for signal propagation
 - Designed complex wireless radio and fiber optic telecommunications systems from “cradle to grave”
- DSP Programmer**, VoCAL Technologies Ltd. (Buffalo, NY) May 1996 – Aug. 1996
- Developed software for 32-bit error-control (CRC code) in serial data communications (V.42 modem)
 - Programmed in C and DSP (Analog Devices Inc. 2100-family chip assembly code)

Other noteworthy projects (SUNY Buffalo)

- Modeled the atmospheric effects on radiowave propagation
- Studied medical/radar image processing and reconstruction using Fourier Array techniques
- Developed a model Erbium-Doped Fiber Amplifier (EDFA) for long distance fiber optic communications

TEACHING EXPERIENCE

- Teaching Assistant**, University of California, Davis Sept. 2005 – Present
Linear Algebra, Calculus II (Lead TA), Numerical Analysis
- Instructor; Teaching Associate**, San Francisco State University Sept. 2002 – May 2005
College Algebra; 12 sections of Calculus I, II, III
- Instructor**, Art Institute of California, San Francisco Jan. 2002 – June 2002
Two sequences of College Algebra
- Teaching Assistant**, SUNY Buffalo, Dept. of Elect. & Comp. Eng. Jan. 1995 – Dec. 1996
Signals & Systems, Electromagnetic Theory, Elect. Eng. Concepts for Non-majors

ACADEMIC SERVICE

Anonymous referee for articles in *IEEE Transactions on Information Theory*, *IEEE Journal of Selected Topics in Signal Processing*, *Journal of Fourier Analysis and Applications*, *Foundations of Computational Mathematics*, *European Conference on Signal Processing*

AWARDS AND HONORS

- UC Davis Graduate Research Award in Engineering and Computer-related Applications, Summer 2008
- NSF VIGRE Research Fellowship, Spring 2006, Winter, Summer 2007
- NSF Computer Science, Engineering, and Mathematics Scholarship, Fall 2003 – Spring 2004
- Recipient of the “Outstanding Teaching Assistant of the Year” Award – 1996
- Graduated Cum Laude with Distinction and received “Academic Honors” – 1995

COMPUTER SKILLS

- Languages: C/C++, Analog Devices Inc. 2100-family DSP (Assembly), FORTRAN, BASIC, TeX
- Development Tools: Matlab, Mathematica, Maple, MS Visual Studio, MFC, SQL Server
- Platforms: Windows NT/XP, Win32, Unix/Linux, Sun/SparcStation

INTERESTS

Strong interest in speech, music, image processing, bio-medical applications and information theory; Semiprofessional musician/percussionist; Extensive experience in audio engineering, video and theater production