

MICHAEL C. GRANT, Ph.D.
Optimization, Computational Mathematics, Engineering Applications

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Current projects:

Principal at CVX Research, Inc., the primary developer of CVX, a popular, award-winning modeling framework for disciplined convex programming in heavy use in teaching, research, and commercial settings.

Independent consultant in optimization and computational mathematics for clients in diverse fields, including defense, energy, forestry, and audio.

Education:

Ph.D., Electrical Engineering. Stanford University, January 2005. Dissertation: “Disciplined Convex Programming.” Advisors: Stephen Boyd and Yinyu Ye.

M.S., Electrical Engineering. Stanford University, 1992.

B.S., Electrical Engineering. The University of Texas at Austin, 1990.

Selected prior appointments:

California Institute of Technology. Staff Scientist, Department of Applied and Computational Mathematics, California Institute of Technology, 2008-2012.

The University of Texas at Austin. Lecturer, Operations Research & Industrial Engineering, Department of Mechanical Engineering, 2010-2011.

Stanford University. Research Associate, Petroleum Engineering, 2006-2007; Consulting Assistant Professor, Electrical Engineering, 2005-2006.

Clarity Wireless, Inc./Cisco Systems, Inc. wireless algorithm design engineer, 1998-2001.

Numerical Technologies, Inc. co-founder, Vice President of Product Development, 1995-1998.

Synergistic activities:

Analytics for the smart grid. Participated in an early-stage startup devoted to the application of advanced analytics approaches to modern retail electricity: smart thermostats, wholesale purchase optimization, demand response.

Compressive sampling for signals intelligence. Participated in a DARPA-sponsored, industry/university collaboration to apply modern compressive sampling algorithms to SIGINT applications. Assisted in the design of novel wideband sensing hardware. Demonstrated high-performance signal reconstruction using parallel processing and GPU-based computation.

Wireless communications. Developed algorithms for an OFDM-based wireless communication system. Constructed a distributed simulation framework to improve simulation productivity by a factor of 1000. Served as chief architect in a collaboration to build an ASIC implementation of full transmit/receive chains. Actively participated in standardization efforts.

Electronic design automation. Co-founded Numerical Technologies, Inc., a company devoted to the advancement of subwavelength semiconductor lithography using advanced numerical algorithms. Applications included process verification, mask defect detection and analysis, and optical proximity correction. Developed first revenue-generating products, and co-negotiated bootstrap financing and partnership. NumeriTech went public in 2000 and was acquired by Synopsys in 2003.

Petroleum engineering. Assisted in the development and promotion of an interdisciplinary program tasked with applying advanced optimization methods to petroleum reservoir design. Led the process to select graduate students and a postdoctoral researcher, and supervised their work. Co-developed a system for performing distributed optimization of reservoir well placement.

Selected publications:

M. Wakin, S. Becker, E. Nakamura, M. Grant, *et. al.*, “A Non-Uniform Sampler for Wideband Spectrally-Sparse Environments”, accepted for publication in *IEEE Journal on Emerging and Selected Topics in Circuits and Systems*, 2012.

J. Yoo, C. Turnes, E. Nakamura, *et. al.*, “A Compressed Sensing Parameter Extraction Platform for Radar Pulse Signal Acquisition“, accepted for publication in *IEEE Journal on Emerging and Selected Topics in Circuits and Systems*, 2012.

S. Becker, E. Candés, and M. Grant, “Templates for Convex Cone Problems with Applications to Sparse Signal Recovery,” *Mathematical Programming Computation*, Volume 3, Number 3, August 2011.

M. Grant and S. Boyd, “Graph Implementations for Nonsmooth Convex Programs,” V. Blondel, S. Boyd, and H. Kimura (eds.), *Recent Advances in Learning and Control (tribute to M. Vidyasagar)*, Springer, 2008.

M. Grant, S. Boyd, and Y. Ye, “Disciplined Convex Programming,” L. Liberti and N. Maculan (eds.), *Global Optimization: From Theory to Implementation*, Springer Science + Business Media, New York, 2005.

S. Boyd, L. Vandenberghe, and M. Grant, “Efficient Convex Optimization for Engineering Design,” *Proceedings IFAC Symposium on Robust Control Design*, September 1994, pp. 14-23.

Selected talks:

M. Grant, “Convex optimization as a tool for engineering design”, Wireless Networking and Engineering Group seminar series, The University of Texas at Austin, November 2007.

M. Grant and D. Echeverria, “Distributed Field Development Optimization (FDO) using MATLAB”, Smart Fields Consortium meeting, Stanford, California, April 2007.

M. Grant and S. Boyd, “CVX: A modeling framework for disciplined convex programming”, ICCOPT II — MOPTA 07, Hamilton, Ontario, August, 2007.

M. Grant, P. Sarma, *et. al.*, “The Smart Field: Advanced Optimization for Petroleum Reservoirs”, ICME Colloquium, November 2006.

Awards:

Beale-Orchard-Hays Prize for Excellence in Computational Mathematical Programming, presented by the Mathematical Optimization Society, 2012 (co-recipient: Stephen Boyd).

National Science Foundation fellowship, Stanford University, 1991-1996.

Virginia and Ernest H. Cockrell scholarship, University of Texas at Austin, 1986-1990.

Miscellany:

Reviewer for the INFORMS Journal on Computing; Computers and Operations Research; Journal of Global Optimization; IEEE Transactions on Signal Processing.

Memberships in IEEE, SIAM, ACM, INFORMS, MPS, MAA.