Gregory T. Ely

Contact Information

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Education

Massachusetts Institute of Technology **2013 September - Present**
Doctor of Philosophy, Geophysics.

Tufts University **2010 - 2013**
Master of Science, Electrical Engineering.

Carleton College **2004 - 2008**
Bachelor of Arts, *Magna cum Laude* with Distinction in Physics.

Research Experience

Massachusetts Institute of Technology **2013 September - present**

Research Assistant
Geophysics Department, Alison Malcolm, Advisor. Exploring applications of reflection seismology techniques to determine bone density from medical ultrasound data. Combining fast forward solvers with particle swarm optimization and Markov Chain Monte Carlo methods to globally estimate and quantify uncertainty of seismic velocity models.

Schlumberger Doll Research **2012 & 2015 Summer**

Intern
Math & Modeling Department, Sandip Bose, Supervisor. Developed matrix factorization algorithms for cement evaluation in boreholes using an ultrasonic transducer to image through the borehole casing.

Tufts University **2010 May - 2013 August**

Research Assistant
Electrical Engineering department, Shuchin Aeron, Advisor. Examined the application of complexity penalized algorithms to solve a variety of inverse problems: hydraulic fracture monitoring, hyperspectral imaging, and 5D interpolation of seismic data.

MIT Lincoln Laboratory **2008 September - 2012 January**

Researcher
Tactical Defense Systems, Kevin Cohen, Supervisor. Developed a modular real-time radar tracker in C++ to run on multiple ground based radar systems. Wrote and debugged real-time imagery and data recording systems in C and C++. Developed MATLAB image processing and tracking tools to perform analyses of infrared imagery. Designed tests of infrared optical systems.

Carleton College **2007 January - 2008 June**

Research Assistant
LIGO Scientific Collaboration, Nelson Christensen, Supervisor. Developed and debugged MATLAB distributed programs which analyzed environmental sensor data to diagnose sources of continuous and intermittent noise in gravitational wave detectors.

Boston University **2006 Summer**

Research Assistant
Hearing Research Center, Department of Biomedical Engineering, Boston University. Steven Colburn, Director. Wrote and debugged software to simulate components of the human auditory system in C++ and Java.

Skills

- Programming Languages: MATLAB, Python, C, C++, Java
- Computational Tools: Mathematica, LaTeX, CVS, Subversion, Git

Fellowships

National Science Foundation Graduate Fellowship Program **2012 -2016**

Selected Publications

Journal Publications

"Smart and Fast Uncertainty Quantification Framework for Velocity Model Building and Imaging," Gregory Ely, Oleg Poliannikov, Alison Malcolm and David Nicholls; The Leading Edge (Submitted October 2016)

"5D seismic data completion and de-noising using a novel class of tensor decompositions", Gregory Ely, Shuchin Aeron, Ning Hao, and Misha E. Kilmer; Geophysics, Vol 80,. No 4, 2015

"Exploiting algebraic and structural complexity for single snapshot computed tomography hyperspectral imaging systems", Bo Fan, Gregory Ely, Shuchin Aeron, and Eric Miller; IEEE Journal on Selected Topics in Signal Processing: Special issue on Advances in Hyperspectral Data Processing and Analysis, 2015

Conference Proceedings

"Combining global optimization and boundary integral methods to robustly estimate subsurface velocity models", Gregory Ely, Alison Malcolm, and David Nicholls; October 2015 SEG Annual meeting, New Orleans, Louisiana

"Novel factorization strategies for higher order tensors: Implications for compression and recovery of multilinear data", Zemin Zhang, Gregory Ely, Shuchin Aeron, Ning Hao and Misha Kilmer; Computer Vision and Pattern Recognition, June 2014, Columbus, Ohio; Oral Presentation & Paperl; Oral Presentation Acceptance Rate 5.75%

"Methods for Large Scale Hydraulic Fracture Monitoring" Gregory Ely and Shuchin Aeron; 2013 December IEEE CAMSAP, Saint Martin, French West Indies, France

"5D and 4D pre-stack seismic data completion using tensor nuclear norm (TNN)" Gregory Ely, Shuchin Aeron, Ning Hao, and Misha E. Kilmer; 2013 September SEG Annual Meeting, Houston, Texas

"Complexity Penalized Hydraulic Fracture Localization and Moment Tensor Estimation Under Limited Model Information" Gregory Ely and Shuchin Aeron; 2013 June, International Congress on Acoustics, Montreal, Canada

"Exploiting Structural Complexity For Robust and Rapid Hyperspectral Imaging" Gregory Ely, Shuchin Aeron, and Eric Miller; 2013 May IEEE ICASSP, Vancover, Canada

"Robust Hydraulic Fracture Monitoring (HFM) of multiple time overlapping events using a generalized discrete radon transform" Gregory Ely and Shuchin Aeron; 2012 July, IEEE IGARSS Symposium, Munich, Germany