Russell J. Hewett — Curriculum Vitae (short form)

Russell J. Hewett
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Education & Training

Postdoctoral Associate, September 2011 – April 2014

Massachusetts Institute of Technology
Dept. of Mathematics & Earth Resources Laboratory (by courtesy)
Advisor: Laurent Demanet

Ph.D. in Computer Science (w/ Computational Science & Engineering option), December, 2011

University of Illinois at Urbana-Champaign
Thesis: *Numerical Methods for Solar Tomography in the STEREO Era*
Advisors: Michael T. Heath and Farzad Kamalabadi

B.S. *in Honors* in Computer Science, *Summa Cum Laude*, May, 2005

Virginia Polytechnic Institute and State University (Virginia Tech)
Thesis: *Wavelet Analysis of Solar Active Regions*
Advisors: Calvin Ribbens and Peter T. Gallagher

Academic & Industrial Experience

Aug 2018-Present	Assistant Professor, Department of Mathematics, Virginia Tech
Aug 2018-Present	Affiliate Faculty in Computational Modeling & Data Analytics, Virginia Tech
Jul 2017-Aug 2018	Chef de Projet (R&D Project Manager) for Inverse Problems, Uncertainty Quantification, and Machine Learning Project, Total E&P Research and Technology USA
May 2014-Aug 2018	Research Scientist, Computational Science & Engineering Department, Total E&P Research and Technology USA
Other experience	Visiting Student, Trinity College Dublin Junior Programmer, L3-Communications GSI, NASA Goddard Space Flight Center Student Intern, NASA Goddard Space Flight Center (3 x summers)

Fellowships and Grants (selected)

2021	DOE Office of Science Early Career Research Program award, for *Domain-decomposition induced parallelism for scientific deep learning at extreme scale* ($750,000)
2021	Lay Nam Chang Dean's Discovery Fund, for *Deep learning for non-linear common-factor modeling and forecasting in economics* ($20,000)
2008-2011	NASA Graduate Student Research Program (GSRP) Fellowship ($90,000)

Invited Lectures & Summer Schools (selected)

Jul 2021	*Modeling @ Alphabet*, Alphabet/Google, Online
Dec 2019	*Department of Mathematics Numerical Analysis Seminar*, University of Maryland, College Park, MD, USA
Apr 2019	Invited Lecturer, *Theory and experience in solving inverse problems in geophysics workshop*, Uppsala University, Uppsala, Sweden
Sep 2018	Invited Instructor, *Summer School on Full Waveform Inversion: Mathematics and Geophysics*, Karlsruhe Institute of Technology, Karlsruhe, Germany
Jul 2013	Instructor for Computational Exercises, *Summer School on Introduction to the Mathematics of Seismic Imaging*, Mathematical Sciences Research Institute (MSRI), Berkeley, CA, USA

Software Projects

DistDL: Distributed Deep Learning for PyTorch, open source, Principle Developer (github.com/distdl)

R&D Performance Seismic Inversion Suite for Total SA, proprietary, Architect and Developer

PySIT: Python Seismic Inversion Toolbox, open source, Principle Developer (www.pysit.org)

SunPy: Python for Solar Physics, open source, Developer and member of Board of Directors (www.sunpy.org)

Minor contributions: AstroPy, NumPy, Hugo Academic

Teaching Experience (selected)

S19,S20,S21	Instructor, CMDA 3634 Computational Science Foundations of CMDA, Virginia Tech
F19,F20	Instructor, CMDA 2006 Integrated Quantitative Science, Virginia Tech
F18	Guest Lecturer, CS 6804 Physics and Machine Learning, Virginia Tech
S13	Recitation Instructor, 18.06 Linear Algebra, Massachusetts Institute of Technology

Publications (selected)

1. M. Taus, L. Zepeda–Núñez, R. J. Hewett, and L. Demanet, "L-Sweeps: A scalable, parallel preconditioner for the high-frequency Helmholtz equation," *Journal of Computational Physics*, 420, November, 2020.
2. R. J. Hewett and T. Grady II, "A Linear Algebraic Approach to Model Parallelism in Deep Learning," *ArXiv*, June, 2020.
3. N. Beams, A. Gillman, and R. J. Hewett, "A parallel implementation of a high order accurate solution technique for variable coefficient Helmholtz problems," *Computers and Mathematics with Applications*, February, 2020.
4. L. Zepeda–Núñez, A. Scheuer, R. J. Hewett, and , L. Demanet, "The Method of Polarized Traces for the 3D Helmholtz Equation," *Geophysics*, April, 2019.
5. J. Chan, R. J. Hewett, and T. Warburton, "Weight Adjusted Discontinuous Galerkin Methods: Wave Propagation in Heterogeneous Media," *SIAM Journal on Scientific Computing*, 39 (6), A2935-A2961, 2017.
6. L. Zepeda–Núñez, R. J. Hewett, M. Rao, and L. Demanet, "Time-stepping beyond CFL: a locally one-dimensional scheme for acoustic wave propagation," 83rd Annual Meeting, SEG, Expanded Abstracts, September, 2013.
7. M. Leinonen, R. J. Hewett, X. Zhang, L. Ying, and L. Demanet, "High-dimensional wave atoms and compression of seismic datasets," 83rd Annual Meeting, SEG, Expanded Abstracts, September, 2013.
8. R. J. Hewett, I. H. Jermyn, M. T. Heath, and F. Kamalabadi, "A Phase Field Method for Tomographic Reconstruction from Limited Data," *Proceedings of the British Machine Vision Conference*, pp. 120.1-120.11, August, 2012.
9. R. J. Hewett, M. T. Heath, M. D. Butala, and F. Kamalabadi, "A Robust Null Space Method for Linear Equality Constrained State Estimation," *IEEE Transactions on Image Processing*, Volume 58, Issue 8, pp. 3961-3971, August, 2010.
10. M. D. Butala, R. J. Hewett, R. A. Frazin, and F. Kamalabadi, "Dynamic Three-Dimensional Tomography of the Solar Corona," *Solar Physics*, Volume 262, Issue 2, pp. 495-509, February, 2010.

Skills, Programming Languages, and Tools

Programming Languages & Frameworks: Python, PyTorch, C, Fortran, C++, MPI, OpenMP, CUDA, LaTeX

Version Control & Project Management: git, JIRA, BitBucket, GitHub, GitLab, hg

Languages: English (native), French (basic)

Other: Woodworking, panoramic photography, 3D printing