

Curriculum Vitae

Felix J. Herrmann, associate professor

Friday, February 12, 2010

Research interests

I am interested in theoretical aspects of exploration seismology. My research concerns the development of new algorithms for seismic data processing, imaging, and full-waveform inversion. My specific interest entails the design of seismic data acquisition and inversion methodologies according to the principles of compressive sampling. These principles lead to less restrictive sampling criteria, resulting in reduced data volumes, and computational costs. I am also interested in the upscaling problem and in the extraction of detailed information on the lithology and fluid-flow properties of rocks from inverted waveforms.

Personal information

SURNAME: Herrmann

FIRST NAME: Felix

MIDDLE NAME(S): Johan

DEPARTMENT/SCHOOL: Earth & Ocean Sciences, the University of British Columbia

FACULTY: Science

PRESENT RANK: Associate professor

SINCE: 01-07-2008

POST-SECONDARY EDUCATION

University or Institution	Degree	Subject Area	Dates
Delft University of Technology	M.Sc. * engineer	Engineering Physics	1991
Delft University of Technology	Ph.D.	Engineering Physics	1997

* The official degree I received from the "Technische Universiteit Delft" is an "ingenieurs diploma" (engineering) degree that is equivalent to a M.Sc.

Title of Dissertation and Name of Supervisor

"A scaling medium representation: a discussion on well-logs, fractals and waves" under supervision of Prof. Dr. Ir. A.J. Berkhout

Special Professional Qualification

Engineering Physics (translated from the Dutch "ingenieurs diploma" at the "Faculteit der Technische Natuurkunde", Technische Universiteit, Delft, the Netherlands)

Professional experience

University, Company or Organization	Rank or Title	Dates
Department of Earth and Ocean Sciences, the University of British Columbia	Associate professor (with tenure)	2008-present
Department of Earth and Ocean Sciences, the University of British Columbia	Assistant professor	2002 - 2008
Earth Resources Laboratory, Department of Earth and Planetary Sciences, Massachusetts Institute of Technology	Senior Founding Member Fellow*	2001-2002
Earth Resources Laboratory, Department of Earth and Planetary Sciences, Massachusetts Institute of Technology	Founding Member Fellow*	1998-2001
Department of Mathematics, Stanford University	Visiting Scholar funded by Netherlands Organization for Scientific Research	1997-1998

* Founding member refers to the companies that support this position.

Honors and awards

2009	Scholarship in support for my sabbatical at the Delft University of Technology;
2005	Honorary mention: Herrmann, F. J. and Moghaddam, P. Non-linear regularization in seismic imaging. In Expanded Abstracts. Canadian Society for Exploration Geophysicists, 2005;
2001	Top 25 ranked paper at the 2000 Annual Meeting of the Society for Exploration Geophysicists;
2001 – 2002	Senior Founding Member Fellow at the Massachusetts Institute of Technology;
1998 – 2001	Founding Member Fellow at Massachusetts Institute of Technology;
1997 - 1998	Netherlands Organization for Scientific Research (NWO) Fellow at Stanford University;
1992	Petroleum price awarded by the Dutch Royal Institute for Engineers (KIVI)

Professional activities

2008 – present	Associate editor of the Journal Geophysical Prospecting
2002 – present	Director Seismic Laboratory for Imaging and Modeling (slim.eos.ubc.ca)
2007	Invited speaker during a workshop at the annual meeting of the Mexican Mathematical Society, Monterrey, Mexico
2007	Keynote speaker at the NSF workshop “Cyber-Enabled Discovery and Innovation: Knowledge Extraction organized” by the Institute for Pure and Applied Mathematics in support for this grant program, University of California, Los Angeles
2007	Plenary speaker at the workshop “Complexity in the Oil Industry”, Natal, Brazil
2007	Invited speaker at the von Neumann Symposium, “Sparse Representation and High-dimensional Geometry”. American Mathematical Society. Snowbird, Utah
2007	Organizer two mini-symposia during the First International Congress of AIP, Vancouver
2007	Invited speaker at the American Mathematical Society, New Orleans
2006	Editorial board of the Journal of Applied Geophysics
2006	Organizer workshop “Reproducible Research in Computational Geophysics using Madagascar software package”, Vancouver
2006	Plenary speaker at the workshop “Rainbow in the Earth: Frequency-dependent Geophysical Properties and their relationships to rock properties at multiple scales”, 2nd International workshop at Berkeley
2005	Invited speaker at the workshop “Time-Frequency Analysis and Nonstationary Filtering”, Banff International Research Station (BIRS), Banff
2005	Invited speaker at the Acoustical Society of America (ASA), Vancouver

- 2005 Organizer mini-symposium at the SIAM Conference on Mathematical and Computational Issues in Geosciences
- 2005 Invited speaker at the American Association for the Advancement of Science (AAAS) Meeting, Washington (see NSERC press release http://www.nserc.gc.ca/news/stories/050222-2_e.htm)
- 2004 Fellow at the Institute for Pure and Applied Mathematics (IPAM) for the Fall semester
- 2003 Invited speaker at a workshop during the Applied Inverse Problems, Lake Arrowhead
- 1999 Organizer mini-symposium at the SIAM Conference on Mathematical and Computational Issues in Geosciences
- 1998 Plenary speaker during the Special SEG session "Recent advances and the road ahead"; SEG, Dallas, USA
- 1991 Plenary speaker during the "Prijsuitreiking (award ceremony) KIVI Petroleumprijs", Utrecht, the Netherlands

Grants

Government:

Granting Agency	Subject	COMP	\$ Per Year	Year	Principal Investigator	Co-Investigator(s)
NSERC	Collaborative Research and Development Grant	C	163,134 206,324 333,079	2006 2007 2008	F. J. Herrmann	O. Yilmaz M. Friedlander
NSERC	Discovery Grant	C	19 k	2006 - 2011	F. J. Herrmann	
NSERC	Discovery Grant	C	16 k	2002 - 2005	F. J. Herrmann	
MITACS	POTSI/Seismic imaging	C	5 k	2003 - 2006	G. Margrave	
UBC	Startup funding	C	60 k	2002	F.J. Herrmann	
NWO	Talent Stipendium	C	50k	1997 - 1998	F. J. Herrmann	

Industry:

Granting Agency	Subject	COMP	\$ Per Year	Year	Principal Investigator	Co-Investigator(s)
BG	SINBAD II	C	67.5	2009	F. J. Herrmann	
BP	SINBAD II	C	67.5 k	2009	F. J. Herrmann	
PGS	Industrialization SINBAD I Software	C	25 k	2009	F. J. Herrmann	

SKY	Ground radar	C	45 k	2005 - 2006	F. J. Herrmann	S. Billings (adjunct professor EOSC)
ITF**	SINBAD	C	345 k	2004 - 2007	F. J. Herrmann	
ChevronTexaco*	ChARM	C	30 k	2003 - 2008	F. J. Herrmann	
Norsk Hydro			70 k	1999 - 2002	N. Toksoz	

*Characterization of Reflectors and Modeling (ChARM) is a Grant in Aid awarded by ChevronTexaco. This grant has recently been renewed.

** Seismic Imaging by Next-generation Basis-function Decomposition (SINBAD) is funded through the Industry Technology Facilitator (<http://www.oil-itf.com/index.htm>) as part of "High Resolution Imaging of Hydrocarbon Reservoirs – A Step Change".

*** DNOISE was fully funded in July 2006 as a NSERC Collaborative Research and Development Grant matching dollar-for-dollar the projects SINBAD and ChARM.

Courses

Course Number	Course name	Class Size
EOSC 352	Geophysical Continuum Dynamics	10
EOSC 110	The Solid Earth – A Dynamic Planet	>100
EOSC 513	Imaging and Estimation with Wavelets	10-20
EOSC 595	Directed Studies	4-8
EOSC 252	Introduction to Experimental Geophysics	15
EOSC 353	Seismology	14

Short courses

Course
February 2009. "Nonlinear seismic data processing & imaging with transform-domain sparsity promotion" One-week course for Petrobras at the Petrophysical Institute LENEP, Macaé - Rio de Janeiro, Brazil.
July 2003. "Wavelets in Seismology II". Two-week course at the Physics Department of the Universidade Federal do Rio Grande do Norte, Natal, Brazil.
November 2005. "Nonlinear seismic imaging and modeling with curvelets". One-day tutorial at BHP Billiton Americas, Houston USA.
Spring 2002, "Wavelets in Seismology I". Invited lecturer for a two-week course at the Physics Department of the Universidade Federal do Rio Grande do Norte, Natal, Brazil.
Spring 2002. "Wavelet methods in Seismology: application of wavelets to multiscale analysis and nonlinear estimation". Invited lecturer for a short-course on wavelets at the Institute for Mathematics and its Applications (IMA), Minneapolis, MN, USA.

Advisees receiving degrees

Student Name	Program Type	Year		Principal Supervisor	Co-Supervisor(s)
		Start	Finish		
P. Kumar	EOSC/MSc.	May 2003	Dec 2003	F. J. Herrmann	
D. Harrison	ECE/MSc.	Feb 2003	May 2005	M. Ito	F. J. Herrmann
J. Christall	EOSC/ M.Eng	Sep 2003	April 2004	D. Oldenburg	F. J. Herrmann
C. Dupuis	IAM/M.Sc.	Sep 2003	July 2005	F. J. Herrmann	O. Yilmaz
P. Moghaddam	EOSC/Ph.D.	Sep 2003	-	F. J. Herrmann	
G. Hennenfent	EOSC/Ph.D.	Jan 2004	April 2008	F. J. Herrmann	
M. Maysami	EOSC/ MSc.	Jan 2006	Jan 2008	F. J. Herrmann	
V. Kumar	EOSC/ MSc.	Sept 2006	-	F. J. Hermann	R. Clowes
E. Lebed	IAM/MSc.	Sept 2006	Sep 2008	F. J. Herrmann	O. Yilmaz
R. Saab ⁺	ECE/Ph.D.	Jan 2006	-	O. Yilmaz	F. J. Herrmann
E. van den Berg ⁺	CPSC/Ph.D.	Sep 2005	-	M. Friedlander	F. J. Herrmann
C. Yarham	EOSC/MSc.	Jan 2007	April 2008	F. J. Herrmann	
F. All-Hashim	EOSC/MSc.	Sep 2007	-	F. J. Herrmann	
J. Johnson	EOSC/MSc.	Sep 2007	-	F. J. Herrmann	
J. Yan	EOSC/MSc.	Sep 2007	-	F. J. Herrmann	
U. Ayaz ⁺	EOSC/MSc.	Sep 2007	-	O. Yilmaz	F. J. Herrmann
M. Al-Matar	EOSC/MSc.	Sep 2008	-	F. J. Herrmann	
G. Tang	Visiting PhD	Sep 2008	Sep 2009	J. Ma	F. J. Herrmann

⁺ These are students I co-supervise as part of the DNOISE project

Undergraduate Students Supervised

Student Name	Program Type	Year		Principal Supervisor	Co-Supervisor(s)
		Start	Finish		
M. Beyreuther	Exchange	Sept 2003 Feb 2005	Mar 2004 April 2005	F. J. Herrmann	
A. Chin	Geo-engineer	Sept 2003	April 2004	F. J. Herrmann	
Y. Carson	Geop	Sept 2003	April 2004	F. J. Herrmann	
S. Teymouri	Geo-engineer	Jun 2005	April 2005	F. J. Herrmann	
T. Lin*	UAA	May 2006	April-2008	F. J. Herrmann	
S. Ross-Ross*	UAA	May 2006	-	F. J. Herrmann	

Advisees*Post-doc and technical support people Supervised*

I have been involved in the supervision of Post-doctoral Fellows, long-term visitors and technical support Staff:

Dr. D. Wang (paid long-term visiting professor, October, 2006-April 2008)
 Dr. C. Sastry (PDF, August 2005-June 2007)
 Dr. H. Modzelewski (senior scientific programmer, May 2005-present)
 Mr. D. Thomson (junior scientific programmer, May 2005-December 2006)
 Mr. C. Brown (junior scientific programmer, January 2007-present)
 Mr. L. Fenelon (Summer Coop Student, April 2008-present)
 Mr. S. Ross-Ross (part-time junior scientific programmer, May 2006-present)
 Dr. Y. Erlanga. (post-doctoral Fellow, December, 2007-present)
 Dr. R. Shahidi (post-doctoral Fellow, February, 2008-present)
 Mrs. D. Burgess (financial and administrative assistant, October 2006-April 2008)

Mrs. P. Lozinsky (financial and administrative assistant, June 2008-September 2008)

Mrs. M. Dosanjh (financial and administrative assistant, Augustus 2008-present)

PUBLICATIONS

REFEREED JOURNAL PAPERS

1. **F. J. Herrmann**, *Y. Erlangga*, and *T. T. Y. Lin*. Compressive simultaneous full-waveform simulation. *Geophysics* 74, A35 (2009).
2. **F. J. Herrmann**, *C. R. Brown*, *Y. A. Erlangga*, *P. P. Moghaddam*. Curvelet-based migration preconditioning and scaling. *Geophysics* 74, A41 (2009).
3. van den Berg, E, M. P. Friedlander, *G. Hennenfent*, **F. J. Herrmann**, R. Saab, O. Yilmaz. Sparco: a testing framework for sparse reconstruction. *ACM Transactions on Mathematical Software*. Volume 35, Issue 4, 29, 2009.
4. *Wang, D.*, R. Saab, O. Yilmaz and **F. J. Herrmann**. Bayesian wavefield separation by transform-domain sparsity promotion. *Geophysics*, Vol 73, No. 5, A33-A38, 2008.
5. *G. Hennenfent*, E. van den Berg, M. P. Friedlander, and **F. J. Herrmann**. New insights into one-norm solvers from the Pareto curve. *Geophysics*, Vol. 73, No. 4, 2008.
6. **Herrmann, F. J.**, *Wang, D.* and Verschuur, D. J. Adaptive curvelet-domain primary-multiple separation. *Geophysics*, Vol 73, No. 3, pp. A17-A21, 2008.*
7. **Herrmann, F. J.** and *Hennenfent, G.* Non-parametric seismic data recovery with curvelet frames, *Geophysical Journal International*, Vol. 173, No. 1, pp. 233-248, 2008.*
8. *Hennenfent, G.* and **Herrmann, F. J.** Simply denoise: wavefield reconstruction via jittered under-sampling. *Geophysics*, Vol. 73, No. 3, pp. V19-V28, 2008.*
9. **Herrmann, F. J.**, *Wang, D.*, *Hennenfent, G.* and *Moghaddam, P.* Curvelet-based seismic data processing: a multiscale and nonlinear approach. *Geophysics*, Vol. 73, No. 1, pp. A1-A5, January-February 2008.*
10. **Herrmann, F. J.**, *Moghaddam, P.* and *Stolk, C.* Sparsity- and continuity-promoting seismic image recovery with curvelet frames. *Applied and Computational Harmonic Analysis*, Vol. 24, No. 2, pp. 150-173, 2008. *
11. **Herrmann, F. J.**, and *Boeniger, U* and Verschuur, D.J. Nonlinear primary-multiple separation with directional curvelet frames. *Geophysical Journal International*, 170, 781-799. 2007.
12. *Lin, T.* and **Herrmann, F. J.**, Compressed extrapolation. *Geophysics*, vol. 72, issue 5, SM77-SM93, (17 figures (54 plots). 2007.
13. *Hennenfent, G* and **Herrmann, F. J.**, "Seismic Denoising with Nonuniformly Sampled Curvelets" *Computing in Science and Engineering*, vol. 8, no. 3, pp. 16-25, May/June, (8 figs). 2006.
14. **Herrmann, F. J.**, Seismic deconvolution by atomic decomposition: a parametric approach with sparseness constraints. *Integr. Computer-Aided Eng.* 12: 69-90 (13 fig). 2005.
15. Tavares, D.M., Lucena, L. S., Schots, H. A., Mundim, E. C., and **Herrmann, F. J.** The deconvolution of seismic data as a fluctuation analysis. *Integr. Computer-Aided Eng.* 12: 25-42 (18 fig). 2005.

16. Bernabé, Y., Mok, U., Evans, B., and **Herrmann, F. J.** Permeability and storativity of binary mixtures of high- and low-porosity materials. *J. Geophys. Res.* 109, B12207 (7 fig.). 2004.
17. **Herrmann, F. J.** and Bernabé, Y. Seismic singularities at upper mantle discontinuities: a site percolation model. *Geophys. J. Int.* 159: 949-960 (8 fig.) 2004. *
18. **Herrmann, F. J.** Singularity characterization by monoscale analysis: application to seismic imaging. *Appl. Comput. Harmon. Anal.* 11: 64–88 (6 fig). 2001.
19. **Herrmann, F. J.**, Lyons, W., and Stark, C. Seismic facies characterization by monoscale analysis. *Geophys. Res. Lett.* 28(19): 3781–3784 (3 fig). 2001.
20. Wapenaar, C. P. A. and **Herrmann, F. J.** True-amplitude migration taking fine-layering into account. *Geophysics*, 61(3): 795–803, May-June 1996.
21. Wapenaar, C.P.A., Slot R. and **Herrmann, F. J.** Towards an extended macro model that takes fine-layering into account. *Journal of Seismic Exploration*, 3: 245-260, 1994.

REFEREED CONFERENCE PROCEEDINGS

1. **F. J. Herrmann**, Sub-Nyquist sampling and sparsity: getting more information from fewer samples. Plenary session SEG “Recent advances and the road ahead”.
2. Gang Tang, Reza Shahidi, **F. J. Herrmann**, and Jianwei Ma, Higher dimensional blue-noise sampling schemes for curvelet-based seismic data recovery, SEG, 2009.
3. Jiupeng Yan and **F. J. Herrmann**, Groundroll prediction by interferometry and separation by curvelet-domain matched filtering, SEG, 2009.
4. Vishal Kumar and **F. J. Herrmann**, Incoherent noise suppression with curvelet-domain sparsity, SEG, 2009.
5. Yogi A. Erlangga and **F. J. Herrmann**, Seismic waveform inversion with Gauss-Newton-Krylov method, SEG, 2009.
6. Reza Shahidi and **F. J. Herrmann**, Curvelet-domain matched filtering with frequency-domain regularization, SEG, 2009.
7. Tim T.Y. Lin, **F. J. Herrmann**, Unified compressive sensing framework for simultaneous acquisition with primary estimation, SEG, 2009.
8. **F. J. Herrmann**, Tim T.Y. Lin, Yogi A. Erlangga, Compressive simultaneous full-waveform simulation, SEG, 2009.
9. **F. J. Herrmann**, Compressive imaging by wavefield inversion with group sparsity, SEG, 2009.
10. **F. J. Herrmann**, Reflector-preserved lithological upscaling, SEG, 2009, Houston.
11. **Herrmann F. J.**, Y. A. Erlangga, and T. T. Y. Lin. Compressive-wavefield simulations. In the proceedings of the 8th international conference on Sampling Theory and Applications (SAMPTA), 2009.
12. Lin, T. T. Y, and **F. J. Herrmann**, Designing simultaneous acquisitions with compressive sensing. In the proceedings of the European Association of Geoscientists and Engineers (EAGE), 2009.

13. **Herrmann, F. J.**, Y. A. Erlangga, T. T.Y. Lin, Compressive sensing applied to full-waveform inversion. In the proceedings of the European Association of Geoscientists and Engineers (EAGE), 2009.
14. *Erlangga, Y. A.*, and **F. J. Herrmann**. Migration with implicit solvers for the time-harmonic Helmholtz equation. In the proceedings of the European Association of Geoscientists and Engineers (EAGE), 2009.
15. *Yarham, C* and **F. J. Herrmann**. Bayesian ground-roll separation by curvelet-domain sparsity promotion. In the proceedings of the Society of Exploration Geophysicists International Exposition and Annual Meeting (SEG), Las Vegas, 2008.
16. **F. J. Herrmann** and *D. Wang*. Seismic wavefield inversion with curvelet-domain sparsity promotion. In the proceedings of the Society of Exploration Geophysicists International Exposition and Annual Meeting (SEG), Las Vegas, 2008.
17. *Maysami, M.*, and **F. J. Herrmann**. Lithological constraints from seismic waveforms: application to the opal-A to opal-CT transition. In the proceedings of the Society of Exploration Geophysicists International Exposition and Annual Meeting (SEG), Las Vegas, 2008.
18. *Moghaddam, P.*, *Cody Brown* and **F. J. Herrmann**. Curvelet-based migration preconditioning In the proceedings of the Society of Exploration Geophysicists International Exposition and Annual Meeting (SEG), Las Vegas, 2008.
19. *Eso, R.*, *Scott Napier*, **F. J. Herrmann** and *Douglas W. Oldenburg*. Iterative reconstruction algorithm for non-linear operators. In the proceedings of the Society of Exploration Geophysicists International Exposition and Annual Meeting (SEG), Las Vegas, 2008.
20. *Lin, T. T. Y.*, *Evgeniy Lebed*, *Yogi A. Erlangga* and **F. J. Herrmann**. Interpolating solutions of the Helmholtz equation with compressed sensing. In the proceedings of the Society of Exploration Geophysicists International Exposition and Annual Meeting (SEG), Las Vegas, 2008.
21. *Kumar, V.*, and **F. J. Herrmann**. Deconvolution with curvelet-domain sparsity. In the proceedings of the Society of Exploration Geophysicists International Exposition and Annual Meeting (SEG), Las Vegas, 2008.
22. *Erlangga, Y* and **F. J. Herrmann**. An iterative multilevel method for computing wavefields in frequency-domain seismic inversion. In the proceedings of the Society of Exploration Geophysicists International Exposition and Annual Meeting (SEG), Las Vegas, 2008.
23. *Hennenfent, G.* and **Herrmann, F. J.** Random sampling: new insights into the reconstruction of coarsely-sampled wavefields. In the proceedings of the Society of Exploration Geophysicists International Exposition and Annual Meeting (SEG), 2007.
24. **Herrmann, F. J.**, *Wang, D.*, *Hennenfent, G.* and *Moghaddam, P.* Seismic data processing with curvelets: a multiscale and nonlinear approach. In the proceedings of the Society of Exploration Geophysicists International Exposition and Annual Meeting (SEG), 2007.
25. **Herrmann, F. J.**, *Wang, D.* and *Gilles Hennenfent., G.* Multiple prediction from incomplete data with the focused curvelet transform. In the proceedings of the Society of Exploration Geophysicists International Exposition and Annual Meeting (SEG), 2007.
26. *Saab, R.*, *Wang, D.*, *Yilmaz, O.* and **Herrmann, F. J.** Curvelet-based primary-multiple separation from a Bayesian perspective. In the proceedings of the Society of Exploration Geophysicists International Exposition and Annual Meeting (SEG), 2007.

27. Verschuur, D. J., Wang, D. and Herrmann, F. J. Multi-term multiple prediction using separated reflections and diffractions combined with curvelet-based subtraction. In the proceedings of the Society of Exploration Geophysicists International Exposition and Annual Meeting (SEG), 2007.
28. Wang, D., Saab, R, Yilmaz, O., Herrmann, F. J. Recent results in curvelet-based primary-multiple separation: application to real data. In the proceedings of the Society of Exploration Geophysicists International Exposition and Annual Meeting (SEG), 2007.
29. Lin, T. and Herrmann, F. J. Compressed wavefield extrapolation with curvelets. In the proceedings of the Society of Exploration Geophysicists International Exposition and Annual Meeting (SEG), 2007.
30. Moghaddam, P., Herrmann, F. J. and Stolk, C. C. Robust seismic amplitude recovery using curvelets. In the proceedings of the Society of Exploration Geophysicists International Exposition and Annual Meeting (SEG), 2007.
31. Moghaddam, P, Herrmann, F. J. and Stolk, C. Seismic amplitude recovery with curvelets. In the proceedings of the Canadian Society of Exploration Geophysicists (CSEG), 2007.
32. Hennenfent, G. and Herrmann, F. J. Irregular sampling: from aliasing to noise. In the proceedings of the European Association of Geoscientists and Engineers (EAGE), 2007.
33. Challa, S., Hennenfent, G. and Herrmann, F. J. Signal reconstruction from incomplete and misplaced measurements. In the proceedings of the European Association of Geoscientists and Engineers (EAGE), 2007.
34. Herrmann, F. J. Surface related multiple predication from incomplete data. In the proceedings of the European Association of Geoscientists and Engineers (EAGE), 2007.
35. Herrmann, F. J., G. Hennenfent, G. and Moghaddam, P. Seismic imaging and processing with curvelets. In the proceedings of the European Association of Geoscientists and Engineers (EAGE), 2007.
36. Maysami, M. and Herrmann, F. J. Seismic reflector characterization by a multiscale detection-estimation method. In the proceedings of the European Association of Geoscientists and Engineers (EAGE), 2007.
37. Moghaddam, P. and Stolk, C. C. and Herrmann, F. J. Sparsity and Continuity Enhancing Seismic Imaging. In the proceedings of the European Association of Geoscientists and Engineers (EAGE), 2007.
38. Hennenfent, G. and Herrmann, F. J., Curvelet reconstruction with sparsity-promoting inversion: successes and challenges. In the proceedings of the European Association of Geoscientists and Engineers (EAGE), 2007.
39. Hennenfent, G. and Herrmann, F. J. Application of stable signal recovery to seismic data interpolation. In Expanded Abstracts, In the proceedings of the Society of Exploration Geophysicists International Exposition and Annual Meeting (SEG), 2006.
40. Carson, Y., Boeniger B. and Herrmann, F.J. Curvelet-based ground roll removal In the proceedings of the Society of Exploration Geophysicists International Exposition and Annual Meeting (SEG), 2006
41. Thomson, D., Hennenfent, G., Modzelewski H. and Herrmann, F.J. A parallel windowed fast discrete curvelet transform applied to seismic processing. In the proceedings of the Society of Exploration Geophysicists International Exposition and Annual Meeting (SEG), 2006.

42. *Hennenfent, G., Herrmann, F. J.*, Sparseness-constrained data continuation with frames: Applications to missing traces and aliased signals in 2/3-D. In the proceedings of the Society of Exploration Geophysicists International Exposition and Annual Meeting (SEG), 2005.
43. *Beyreuther, M., Cristall, J. and Herrmann, F. J.* Computation of time-lapse differences with 3D directional frames. In the proceedings of the European Association of Geoscientists and Engineers (EAGE), 2005.
44. *Hennenfent, G., Herrmann, F. J., and Neelamani, R.* Seismic deconvolution revisited with curvelet frames. In the proceedings of the European Association of Geoscientists and Engineers (EAGE), 2005.
45. *Herrmann, F. J., Moghaddam, P., and Kirlin, R.* Optimization strategies for sparseness- and continuity- enhanced imaging: Theory. In the proceedings of the European Association of Geoscientists and Engineers (EAGE), 2005.
46. *Herrmann, F. J.* Robust curvelet-domain data continuation with sparseness constraints. In the proceedings of the European Association of Geoscientists and Engineers (EAGE), 2005.
47. *Herrmann, F. J. and Verschuur, D. J.* Robust curvelet-domain primary-multiple separation with sparseness constraints. In the proceedings of the European Association of Geoscientists and Engineers (EAGE), 2005.
48. *Herrmann, F. J. and Hennenfent, G.* Non-linear data continuation with redundant frames. In the proceedings of the Canadian Society of Exploration Geophysicists (CSEG), 2005.
49. *Herrmann, F. J. and Moghaddam, P.* Non-linear regularization in seismic imaging. In the proceedings of the Canadian Society of Exploration Geophysicists (CSEG), 2005.
50. *Hennenfent, G., Herrmann, F. J., and Neelamani, R.* Sparseness-constrained seismic deconvolution with Curvelets. In the proceedings of the Canadian Society of Exploration Geophysicists (CSEG), 2005.
51. *Herrmann, F. J. and Moghaddam, P.* Curvelet-domain preconditioned "wave-equation" depth-migration with sparseness & illumination constraints In the proceedings of the Society of Exploration Geophysicists International Exposition and Annual Meeting (SEG), 2004.
52. *Herrmann, F. J. and Moghaddam, P.* Curvelet-based non-linear adaptive subtraction with sparseness constraints. In *Expanded Abstracts*, SEG.Tulsa, 2004.
53. *Hennenfent, G. and Herrmann, F. J.* Three-term amplitude-versus-offset (avo) Inversion revisited by curvelet and wavelet transform. In the proceedings of the Society of Exploration Geophysicists International Exposition and Annual Meeting (SEG), 2004.
54. *Moghaddam, P. and Herrmann, F. J.* Migration preconditioning with curvelets. In the proceedings of the Society of Exploration Geophysicists International Exposition and Annual Meeting (SEG), 2004.
55. *Herrmann, F. J. and Verschuur, D.J.* Curvelet-domain multiple elimination with sparseness constraints. In the proceedings of the Society of Exploration Geophysicists International Exposition and Annual Meeting (SEG), 2004.
56. *Beyreuther, M. Cristall, J. and Herrmann, F. J.* Curvelet denoising of 4d seismic. In the proceedings of the European Association of Geoscientists and Engineers (EAGE), 2004.

57. **Herrmann, F. J.** and *Moghaddam, P.* Curvelet-domain least-squares migration with sparseness constraints. In the proceedings of the European Association of Geoscientists and Engineers (EAGE), 2004.
58. **Herrmann, F. J.** and Verschuur, D.J. Separation of primaries and multiples by non-linear estimation in the curvelet domain. In the proceedings of the European Association of Geoscientists and Engineers (EAGE), 2004.
59. **Herrmann, F. J.** Curvelet imaging and processing: an overview. In the proceedings of the Canadian Society of Exploration Geophysicists (CSEG), 2004.
60. **Herrmann, F. J.** and *Moghaddam, P.* Curvelet imaging and processing: sparseness-constrained least-squares migration. In the proceedings of the Canadian Society of Exploration Geophysicists (CSEG), 2004.
61. **Herrmann, F. J.** and Verschuur, D.J. Curvelet imaging and processing: adaptive multiple elimination. In the proceedings of the Canadian Society of Exploration Geophysicists (CSEG), 2004.
62. *Beyreuther, M.*, *Cristall, J.* and **Herrmann, F. J.** Curvelet imaging and processing: 4d adaptive subtraction. In the proceedings of the Canadian Society of Exploration Geophysicists (CSEG), 2004.
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SELECTION OF RECENT TALKS

1. Compressive-wavefield simulations. Seminar Wavefield Simulations. Mathematics Department Delft University of Technology, Delft, the Netherlands, May 2009.
2. SINBAD project overview: curvelet-based seismic data processing & imaging. Petrobras, Rio de Janeiro, Brazil, February 2009.
3. Compressive sensing: a paradigm shift for the imaging sciences? Imaging Science & Technology Seminar. Engineering Physics Department, Delft University of Technology, January 2009.
4. Compressive wavefield simulation. ExxonMobil. Corporate Research. Clinton, New Jersey, January 2009.
5. Compressive sampling applied to exploration seismology: a paradigm shift? Department Seminar. Material Science Department. Tsinghua University, Beijing, China, November 2008. (also given at Chinese Academy of Sciences, PetroChina, and Jilin University)
6. Seismic noise: the good, the bad, & the ugly. SEG Workshop, November 2008.
7. Curvelet-domain matched filtering. Presented at SEG Workshop, November 2008.
8. Seismic wavefield inversion with curvelet-domain sparsity promotion. Presented at SEG, November 2008.
9. Compressive sampling meets seismic imaging. Presented at the Society of Industrial and Applied Mathematics Conference on Imaging Science, San Diego, July 2008.
10. SINBAD project overview: curvelet-based seismic data processing & imaging. Presented at BP, ConocoPhillips, Shell, Schlumberger-WesterGeco, Total, PGS, CGGVeritas, Armada Hess, ExxonMobil, Houston, October 2008.
11. Compressive sampling: a new paradigm for seismic data acquisition and processing? Presented at the ION Technical Forum, Sprowston, UK, April 2008.
12. Compressive sampling meets seismic imaging at the PIMS-CINVESTAV Mathematics of Oil Exploration Workshop at the annual meeting of the Mexican Mathematical Society in Monterrey, Mexico, October 18-19, 2007.
13. Imaging shapes from seismic data: what wavefronts tell us about percolation-induced singularities in the Earth subsurface at IPAM's workshop "Image Processing for Random Shapes: Applications to Brain Mapping, Geophysics and Astrophysics". May 21 - 25, 2007.
14. Sparsity- and continuity-promoting seismic image recovery with curvelet frames at the American Mathematical Society. "Nonsmooth Analysis in Inverse and Variational Problems", January 2007.
15. Non-linear seismic data regularization and separation with separable curvelet frames at Time-Frequency Analysis and Nonstationary Filtering" workshop at Banff International Research Station (BIRS), September 2005.
16. Multi-scale seismic imaging: from seismic reflectivity to connectivity invited at Rainbow in the Earth: Frequency-dependent Geophysical Properties and their relationships to rock properties at multiple scales, 2nd international workshop at Berkeley, August 2005.

RECENT RESEARCH ACCOMPLISHMENTS

Seismic data regularization [Herrmann and Hennenfent, 2007] and Sub-Nyquist jittered sampling techniques [Hennenfent and Herrmann, 2007]. This work combines sparsifying transforms, one-norm solvers and random subsampling schemes that favor recovery from sub-Nyquist sampling;

Coherent signal separation by transform-domain sparsity promotion [Herrmann et. al., 2008, Herrmann et.al., 2006 and Saab et.al, 2007]. We contributed by improving on adaptive subtraction-based surface-related multiple elimination. Our transform-domain primary-multiple separation is robust w.r.t. to clutter and errors in the multiple prediction;

Curvelet-domain matched filtering [Herrmann et. al., 2008, Herrmann et.al., 2007]. In this work, we correct for smoothly varying amplitude errors in the predicted to-be-separated signal components through curvelet-domain scaling;

Seismic-image amplitude recovery [Herrmann et.al., 2007]. This work involves a rigorous bound on the accuracy of curvelet-domain diagonal approximations of zero-order pseudo-differential operators (high-frequency approximations of the normal operator of seismic imaging). This approximation is used to correct the image amplitudes through a scheme that promotes sparsity in the scaled curvelet domain;

Compressed wavefield extrapolation [Lin and Herrmann, 2007]. In this work, we developed a new algorithm where mutual incoherence amongst the eigenfunctions of the Helmholtz operator and curvelets is used to compressively sample (compress) one-way wavefield extrapolation operators.

Preconditioning of the time-harmonic Helmholtz solver [Erlangga and Herrmann, 2008] In this work, we present a new indirect type of preconditioning for the time-harmonic Helmholtz solver, which constitutes an order-of-magnitude improvement for both the computational complexity and memory imprint. This solver will form the basis on my future research efforts towards imaging and full-waveform inversion.

Curvelet conditioning of least-squares migration [Herrmann et. al., 2008, 2009] In this work, we introduce a method to condition least-squares reverse-time migration using a combination of Fourier, physical, and curvelet-domain scalings.

Simultaneous full-waveform simulation [Herrmann et. al 2008, 2009]. In this work, I established a direct connection between simultaneous-source acquisition and processing, and compressive sensing. With this connection, I am able to drastically reduce the computational costs of full-waveform modeling by reducing the number of right-hand sides by doing “simultaneous acquisition” during which all source fire. This work offers exiting perspectives towards a new imaging and full-waveform inversion methods where the numerical complexity is no longer determined by the size of the data acquisition and model but instead by its transform-domain sparsity.

Compressive imaging by wavefield inversion with group-sparsity promotion [Herrmann 2009]. In this work, I leverage the techniques of compressive sampling at the imaging step in the model space. By formulating the imaging step as a multi-dimensional wavefield deconvolution, I am able to significantly reduce the size of these wavefields. In combination with sparsity promotion and focusing towards the near offsets, this approach allows for a recovery from compressively sampled wavefields and leads to system-size reduction with sub-sampling rates, and hence modeling, and storage costs, that can be chosen in par with the sparsity of the object of interest;

OTHER RELEVANT INFORMATION

As the director of the Seismic Laboratory for Imaging and modelling (SLIM) and the principal investigator of the NSERC Collaborative Research and Development Grant DNOISE, I have the following responsibilities (in addition to the responsibilities I have as a tenure-track professor):

Reporting to NSERC and supporting companies. This task includes the compilation of annual financial and progress reports. These reports are required by NSERC. My duties include the coordination of the reporting, financial administration and budget forecasts for all research activities conducted as part of the DNOISE and industry projects.

Maintenance of industrial contacts. This task includes regular visits to sponsoring companies and coordination of industrial visits to UBC. Since the start of my Industry Consortium, I have on average hosted at least three different researchers from each participating company;

Management and diversification of the funding portfolio. This task involves initiatives that are aimed at a diversification of the funding portfolio that supports my research program. My activities also include networking amongst potential new consortium members.

Coordination of industry research contracts, non-disclosure agreements and patents. This task involves coordination between our industrial partners and UBC's Liaison Office (UILO) on legal, intellectual property and industrialization aspects related to the activities at and the technology developed by the Seismic Laboratory of Imaging and Modeling. My activities involved the coordination of license agreements between the Californian Institute of Technology, UBC and the industrial partners. With the recent call by industry for the industrialization of certain algorithms developed by my laboratory, my activities recently also include finding commercial partners for our technology and preparations for filing provisional patents.

Dissemination of research findings to industry. This task involves the organization of regular consortia meetings, the release of technical reports and the authoring of expanded abstracts for the annual meetings of the following professional organizations: Canadian Society for Exploration Seismology (CSEG), Society for Exploration Geophysicists (SEG) and the European Association of Geoscientists and Engineers (EAGE). Industrial consortia like mine are evaluated by industry by the number and quality of expanded abstracts and talks presented at these professional meetings.

Coordination of software releases. This task involves the oversight of the development and release of software that implements our algorithms. Our software is aside from the HQP the main deliverable of my group to industry. This task involves supervising 2-3 FTE's that assist my students in preparing our software releases.

Coordination of industrial internships. This task involves all organizational aspects of setting up internships for the students at the Seismic Laboratory for Imaging and Modeling (SLIM) with member and potential member companies. This activity requires coordination regarding intellectual property and open access to the research findings obtained during these internships.

Hiring of highly-qualified personnel (HQP). This task includes the hiring of post-doctoral fellows, scientific programmers, undergraduate summer coops and graduate students (M.Sc. and Ph.D.). The current demand for HQP by industry and other academic institutions has made this a considerable effort aside from the usual coordination of advertisements, interviewing and administrative aspects.

Coordination of computational and information technology facilities. This task involves the purchase of hardware for the Seismic Laboratory and the members of the Collaborative Research and Development Grant; DNOISE. The annual budget is over \$ 50 k and my task is to coordinate the hard and software purchases involving the purchase and maintenance of a \$ 500 k compute cluster.

Coordination of the DNOISE interdisciplinary seminar series. This task involves the coordination of an interdepartmental seminar series that forms an important communication platform amongst all faculty, students, post-doctoral fellows and technical support involved in DNOISE.

Hosting of visitors. This task involves the coordination and hosting of academic short- and long-term visitors, including assistance with visas, places to stay and travel arrangements.