Ali Siahkoohi

Email: alisk@gatech.edu
Personal website: alisiahkoohi.github.io
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Education

Georgia Institute of Technology September 2016 – August 2022 (expected)
756 W Peachtree St NW, Floor 13, Atlanta, GA 30308, USA
Doctor of Philosophy in Computational Science and Engineering
- Degree Advisor: Felix J. Herrmann

University of Tehran September 2013 – March 2016
North Kargar St, Tehran, Tehran, Iran
Master of Science in Geophysics
- Degree Advisor: Ali Gholami

Sharif University of Technology September 2008 – August 2013
Azadi Ave., Tehran, Tehran, Iran
Bachelor of Science in Electrical Engineering

Research Interests

Deep Learning, Inverse Problems, Uncertainty Quantification, Variational Inference, Signal Processing

Research Experience

Georgia Institute of Technology
Graduate Research Assistant February 2018 – Present

The University of British Columbia
Graduate Research Assistant September 2016 – January 2018

Teaching Experience

Georgia Institute of Technology
Graduate Teaching Assistant
- Imaging with Data-Driven Models September 2019 – December 2019
- Numerical Analysis I September 2018 – December 2018

Sharif University of Technology
Teaching Assistant
- Signals and Systems January 2011 – May 2011
- Digital Signal Processing January 2011 – May 2011
- Linear Algebra September 2010 – December 2010
- Principles of Electrical Engineering Laboratory September 2009 – December 2009

Programming Skills

Languages: Python, Julia, C, MATLAB, Bash
Machine Learning Libraries: TensorFlow, PyTorch, Flux.jl
Cloud Services Platform: Amazon Web Services (AWS)
Message Passing Standard: MPI
Version Control Systems: Git, SVN
Document Preparation Systems: LaTeX, Markdown

Publications

[1] Mathias Louboutin, **Ali Siahkoohi**, Rongrong Wang, and Felix J. Herrmann. "Low-memory stochastic backpropagation with multi-channel randomized trace estimation". June 2021. URL: https://arxiv.org/pdf/2106.06998.pdf.

[2] **Ali Siahkoohi** and Felix J. Herrmann. "Learning by example: fast reliability-aware seismic imaging with normalizing flows". Apr. 2021. URL: https://arxiv.org/pdf/2104.06255.pdf.

[3] Rajiv Kumar, Maria Kotsi, **Ali Siahkoohi**, and Alison Malcolm. "Enabling uncertainty quantification for seismic data pre-processing using normalizing flows (NF)—an interpolation example". Apr. 2021. URL: https://slim.gatech.edu/Publications/Public/Conferences/SEG/2021/kumar2021SEGeuq/kumar2021SEGeuq.pdf.

[4] **Ali Siahkoohi**, Gabrio Rizzuti, Mathias Louboutin, Philipp Witte, and Felix J. Herrmann. "Preconditioned training of normalizing flows for variational inference in inverse problems". In: *3rd Symposium on Advances in Approximate Bayesian Inference*. Jan. 2021. URL: https://openreview.net/pdf?id=P9m1sMaNQ8T.

[5] **Ali Siahkoohi**, Gabrio Rizzuti, Mathias Louboutin, and Felix J. Herrmann. "Unsupervised data-guided uncertainty analysis in imaging and horizon tracking". In: *3rd Annual Meeting of the SIAM Texas-Louisiana Section*. Oct. 2020.

[6] **Ali Siahkoohi**, Philipp A. Witte, Mathias Louboutin, Felix J. Herrmann, and Gabrio Rizzuti. "Seismic Imaging with Uncertainty Quantification: Sampling from the Posterior with Generative Networks". In: *SIAM Conference on Imaging Science*. IS20. July 2020.

[7] **Ali Siahkoohi**, Gabrio Rizzuti, Philipp A. Witte, and Felix J. Herrmann. "Faster Uncertainty Quantification for Inverse Problems with Conditional Normalizing Flows". In: *Tech. rep. TR-CSE-2020-2, Georgia Institute of Technology*. July 2020. URL: https://arxiv.org/pdf/2007.07985.pdf.

[8] Gabrio Rizzuti, **Ali Siahkoohi**, Philipp A. Witte, and Felix J. Herrmann. "Parameterizing uncertainty by deep invertible networks, an application to reservoir characterization". In: *SEG Technical Program Expanded Abstracts 2020*. Sept. 2020, pp. 1541–1545. DOI: 10.1190/segam2020-3428150.1. URL: https://arxiv.org/pdf/2004.07871.pdf.

[9] Mi Zhang, **Ali Siahkoohi**, and Felix J. Herrmann. "Transfer learning in large-scale ocean bottom seismic wavefield reconstruction". In: *SEG Technical Program Expanded Abstracts 2020*. Sept. 2020, pp. 1666–1670. DOI: 10.1190/segam2020-3427882.1. URL: https://arxiv.org/pdf/2004.07388.pdf.

[10] **Ali Siahkoohi**, Gabrio Rizzuti, and Felix J. Herrmann. "Weak deep priors for seismic imaging". In: *SEG Technical Program Expanded Abstracts 2020*. Sept. 2020, pp. 2998–3002. DOI: 10.1190/segam2020-3417568.1. URL: https://arxiv.org/pdf/2004.06835.pdf.

[11] **Ali Siahkoohi**, Gabrio Rizzuti, and Felix J. Herrmann. "Uncertainty quantification in imaging and automatic horizon tracking—a Bayesian deep-prior based approach". In: *SEG Technical Program Expanded Abstracts 2020*. Sept. 2020, pp. 1636–1640. DOI: 10.1190/segam2020-3417560.1. URL: https://arxiv.org/pdf/2004.00227.pdf.

[12] **Ali Siahkoohi**, Gabrio Rizzuti, and Felix J. Herrmann. "A deep-learning based Bayesian approach to seismic imaging and uncertainty quantification". In: *82nd EAGE Conference and Exhibition 2020*. Jan. 2020. URL: https://arxiv.org/pdf/2001.04567.pdf.

[13] Felix J. Herrmann, **Ali Siahkoohi**, and Gabrio Rizzuti. "Learned imaging with constraints and uncertainty quantification". In: *NeurIPS 2019 Deep Inverse Workshop*. Dec. 2019. URL: https://arxiv.org/pdf/1909.06473.pdf.

[14] **Ali Siahkoohi**, Mathias Louboutin, and Felix J. Herrmann. "Neural network augmented wave-equation simulation". In: *Tech. rep. TR-CSE-2019-1, Georgia Institute of Technology*. Sept. 2019. URL: https://arxiv.org/pdf/1910.00925.pdf.

[15] **Ali Siahkoohi**, Rajiv Kumar, and Felix J. Herrmann. "Deep-learning based ocean bottom seismic wavefield recovery". In: *SEG Technical Program Expanded Abstracts 2019*. Aug. 2019, pp. 2232–2237. DOI: 10.1190/segam2019-3216632.1.

[16] **Ali Siahkoohi**, Dirk J. Verschuur, and Felix J. Herrmann. "Surface-related multiple elimination with deep learning". In: *SEG Technical Program Expanded Abstracts 2019*. Aug. 2019, pp. 4629–4634. DOI: 10.1190/segam2019-3216723.1.

[17] **Ali Siahkoohi**, Mathias Louboutin, and Felix J. Herrmann. "The importance of transfer learning in seismic modeling and imaging". In: *Geophysics* 84.6 (July 2019), A47–A52. DOI: 10.1190/geo2019-0056.1.

[18] Gabrio Rizzuti, **Ali Siahkoohi**, and Felix J. Herrmann. "Learned iterative solvers for the Helmholtz equation". In: *81st EAGE Conference and Exhibition 2019*. June 2019. DOI: 10.3997/2214-4609.201901542.

[19] Felix J. Herrmann, **Ali Siahkoohi**, and Mathias Louboutin. "Machine Learning in Seismic Imaging—from Low-fidelity to High-fidelity". In: *SIAM Conference on Computational Science and Engineering*. (SIAM CSE). Mar. 2019.

[20] **Ali Siahkoohi**, Mathias Louboutin, Rajiv Kumar, and Felix J. Herrmann. "Deep-convolutional neural networks in prestack seismic—two exploratory examples". In: *SEG Technical Program Expanded Abstracts 2018*. Oct. 2018, pp. 2196–2200. DOI: 10.1190/segam2018-2998599.1.

[21] Felix J. Herrmann, Gerard J. Gorman, Jan Hückelheim, Keegan Lensink, Paul Kelly, Navjot Kukreja, Henryk Modzelewski, Michael Lange, Mathias Louboutin, Fabio Luporini, **Ali Siahkoohi**, and Philipp A. Witte. "The power of abstraction in Computational Exploration Seismology". In: *Smoky Mountains Computational Sciences and Engineering Conference*. Aug. 2018.

[22] **Ali Siahkoohi**, Rajiv Kumar, and Felix J. Herrmann. "Seismic Data Reconstruction with Generative Adversarial Networks". In: *80th EAGE Conference and Exhibition 2018*. June 2018. DOI: 10.3997/2214-4609.201801393.

[23] **Ali Siahkoohi** and Ali Gholami. "Sparsity Promoting Least Squares Migration for Laterally Inhomogeneous Media". In: *7th EAGE Saint Petersburg International Conference and Exhibition*. Apr. 2016. DOI: 10.3997/2214-4609.201600223.

[24] Mohmmad Sadegh Ebrahimi, Mohammad Hossein Daraei, Jamshid Rezaei, and **Ali Siahkoohi**. "A Novel Utilization of Wireless Sensor Networks as Data Acquisition System in Smart Grids". In: *Materials Science and Information Technology*. Vol. 433. Advanced Materials Research. Trans Tech Publications, Jan. 2012, pp. 6725–6730. DOI: 10.4028/www.scientific.net/AMR.433-440.6725.

[25] Amir Najafi, **Ali Siahkoohi**, and Mohammad B. Shamsollahi. "A content-based digital image watermarking algorithm robust against JPEG compression". In: *2011 IEEE International Symposium on Signal Processing and Information Technology (ISSPIT)*. IEEE. Feb. 2011, pp. 432–437. DOI: 10.1109/ISSPIT.2011.6151601.