Juncai He: Curriculum Vitae

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Research Interest

- Deep Learning, Stochastic Optimization.
- Numerical Analysis, Finite Element Methods, Multigrid Methods.

Academic Experience

- **Postdoctoral Scholar** August 2019 - present
  Department of Mathematics, Pennsylvania State University, University Park, PA

Education

- **Ph.D.**, Computational Mathematics, Peking University, 2014-2019
  Advisors: Prof. Jun Hu and Prof. Jinchao Xu
  Thesis: Finite Element Methods and Deep Neural Networks
- **Visiting Ph.D. Research Scholar**, Center for Computational Mathematics and Application, Department of Mathematics, The Pennsylvania State University, Feb. 2016 - Jul. 2016, Oct. 2017 - Mar. 2018 and Mar. 2019 - May 2019
- **B.S.**, Mathematics and Applied Mathematics, Sichuan University, 2010-2014

Honor and awards

- 2016-2019, The Elite Program of Computational and Applied Mathematics for PHD Candidates of Peking University
- 2017-2019, Ph.D. President Scholarship, Peking University
- 2015, Graduate academic scholarship, Peking University
- 2014, First Prize, Outstanding undergraduate thesis, Sichuan University
- 2011-2014, Excellent undergraduate student scholarship, Sichuan University

The Workshops/ Minisymposium Organized

- Workshop on Mathematical Data Science and Application (Organizing Committee), April 27-17, 2020, Penn State University, USA
- Minisymposium on "Multigrid and Machine Learning" (Co-organizer with Prof. Zuowei Shen and Prof. Jinchao Xu) in International Multigrid Conference , August 11-16, 2019, Kunming, China

- 4th PKU Workshop on Numerical Methods for PDEs (Organizing Committee), October 30-31, 2018, Peking University, China
- The First PKU Elite PHD Candidates Workshop on Computational Mathematics and 4th Beijing Graduate Students Workshop on Computational Mathematics (Chair of the Organizing Committee), September 9-12, 2018, Peking University, China

Presentations

- Workshop on Computation and Applications of PDEs Based on Machine Learning, Jilin University, Changchun (Online), China, Jul. 2020.
- Data Science Seminar, Shanghai Jiao Tong University, Shanghai (Online), China, Mar. 2020.
- "Advances in Multilevel Methods: from PDEs to Data Intensive Studies" and "Multigrid and Machine Learning", Minisymposiums in International Multigrid Conference, Kunming, China, Aug. 2019.
- 16th Annual Meeting of the China Society for Industrial and Applied Mathematics, Chengdu, China, Sept. 2018.
- The First PKU Elite PHD Candidates Workshop on Computational Mathematics and 4th Beijing Graduate Students Workshop on Computational Mathematics, Peking University, Beijing, China, Sept. 2018.
- Workshop on Numerical Methods for PDEs, Peking University, Beijing, China, Jul. 2017.

Skills

- **Languages**: Chinese, English
- **Programming**: Latex, C, Matlab, MPI, Python, Pytorch

Teaching Experience

- Teaching Assistant, An Introduction for Applied Mathematics, Peking University, Feb. 2017 - Jun. 2017
- Senior Teaching Assistant, Advanced Linear Algebra I, Peking University, Sept. 2016 - Jan. 2017
- Senior Teaching Assistant, Calculus, Peking University, Sept. 2015 - Jan. 2016

Publications

1. **J. He**, X. Jia, J. Xu, L. Zhang and L. Zhao. Make ℓ_1 Regularization Effective in Training Sparse CNN. *Computational Optimization and Applications*. 2020. https://doi.org/10.1007/s10589-020-00202-1
2. **J. He**, L. Li, J. Xu, and Z. Zheng. Relu Deep Neural Networks and linear Finite Elements. *Journal of Computational Mathematics*. 38(3): 502–527, 2020. doi:10.4208/jcm.1810-m2018-0096.
3. **J. He**, K. Hu, J. Xu. Generalized Gaffney Inequality and Discrete Compactness for Discrete Differential Forms. *Numerische Mathematik*. 143, 781–795, 2019 . https://doi.org/10.1007/s00211-019-01076-0.

4. **J. He** and J. Xu. MgNet: A Unified Framework of Multigrid and Convolutional Neural Network. *Science China Mathematics*. 62(7): 1331–1354, 2019. https://doi.org/10.1007/s11425-019-9547-2.

5. **J. He**, Y. Chen, L. Zhang and J. Xu. Constrained Linear Data-feature Mapping in Image Classification. ArXiv: 1911.10428, 2019.

6. **J. He**, J. Siegel, J. Xu and L. Zhang. Machine Learning Training Algorithms From the Markov Chain Monte Carlo Perspective. in preparation, 2020.

7. **J. He**, L. Li and J. Xu. Approximation Properties of ReLU Deep Neural Networks from the Perspective of Hierarchical Basis. In preparation. 2020.

8. **J. He**, K. Hu, J. Xu. Method of Characteristics for the MHD System with Application of Lie Derivative. In preparation. 2020.

Last updated: July 16, 2020