

# Senwei Liang

Mathematics PhD Candidate

[Semantic scholar](#), [Google scholar](#), [Github](#)

[Personal Page](#)

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## RESEARCH DIRECTION

My research interest mainly focuses on scientific machine learning and deep learning algorithms.

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## EDUCATION

- **Purdue University** West Lafayette, USA  
*PhD Candidate. Advisor: Prof. Haizhao Yang* *Dec. 2019 – Expected Aug. 2022*
- **National University of Singapore** Singapore, Singapore  
*Master of Science. Advisor: Prof. Haizhao Yang* *Aug. 2017 – Dec. 2019*
  - **GPA:** 4.86/5.0;
  - **Core Curriculum:** Graduate Analysis (A+), Optimization (A+), Computational Mathematics (A+).
- **Sun Yat-Sen University** Guangzhou, China  
*Mathematics and Applied Mathematics, Bachelor of Science. Advisor: Prof. Lihua Yang* *Aug. 2013 – Jun. 2017*
  - **GPA:** 4.40/5.0; **Synthesizing grade ranking:** 1/102;
  - **Core Curriculum:** Analysis (98/100), Algebra (97/100), Geometry (99/100), Ordinary Differential Equation (98/100), Probability Theory (98/100), Real Analysis (97/100), Complex Analysis (100/100).

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## INTERNSHIP

- **Argonne National Laboratory** Lemont, USA  
*Wallace Givens Associate. Advisor: Prof. Hong Zhang* *May 2021 – July 2021*
- **Computational Medical Imaging Laboratory** Guangzhou, China  
*Research Assistant. Advisor: Prof. Yao Lu* *June 2016 – January 2017*

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## PUBLICATIONS AND MANUSCRIPTS

1. **S. Liang**, Z. Huang, H. Zhang, Stiffness-aware neural network for learning Hamiltonian systems. Accepted by **International Conference on Learning Representations (ICLR) 2022**. [\[PDF\]](#) (First author)
2. Y. Gu, J. Harlim, **S. Liang**, H. Yang, Stationary Density Estimation of Itô Diffusions Using Deep Learning. Submitted. [\[PDF\]](#) (Alphabetical order)
3. **S. Liang**, S. W. Jiang, J. Harlim, H. Yang, Solving PDEs on Unknown Manifolds with Machine Learning. Submitted. [\[PDF\]](#) (First author)
4. **S. Liang\***, L. Lyu\*, C. Wang, H. Yang, Reproducing Activation Function for Deep Learning. Submitted. [\[PDF\]](#) (Joint first author)
5. Z. Huang\*, **S. Liang\***, M. Liang, W. He, H. Yang, Efficient Attention Network: Accelerate Attention by Searching Where to Plug. Submitted. [\[PDF\]](#) [\[Code\]](#) (Joint first author)
6. J. Xue, N. Jiang, **S. Liang**, Q. Pang, T. Yabe, S.V. Ukkusuri, J. Ma, Quantifying spatial homogeneity of urban road networks via graph neural networks. **Nature Machine Intelligence**, to appear. [\[PDF\]](#) [\[Code\]](#)
7. J. Harlim, S. W. Jiang, **S. Liang**, H. Yang, Machine Learning for Prediction with Missing Dynamics. **Journal of Computational Physics** 428, 109922. [\[PDF\]](#) (Alphabetical order)
8. W. He, Z. Huang, M. Liang, **S. Liang**, H. Yang, Blending Pruning Criteria for Convolutional Neural Networks. **International Conference on Artificial Neural Networks**, 3-15. [\[PDF\]](#)
9. Z. Huang, **S. Liang\***, M. Liang and H. Yang, DIANet: Dense-and-Implicit Attention Network. **Proceedings of the AAAI Conference on Artificial Intelligence 2020**. [\[PDF\]](#) [\[Code\]](#) (Joint first author)
10. **S. Liang\***, Z. Huang, M. Liang and H. Yang, Instance Enhancement Batch Normalization: An Adaptive Regulator for Batch Noise. **Proceedings of AAAI Conference on Artificial Intelligence 2020**. [\[PDF\]](#) [\[Code\]](#) (Joint first author)

11. **S. Liang**, Y. Khoo, H. Yang, Drop-Activation: Implicit Parameter Reduction and Harmonic Regularization. **Communications on Applied Mathematics and Computation**, 1-19. [\[PDF\]](#) [\[Code\]](#)  
(First author)

## AWARDS

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- AMS Virtual Grad Student Travel Grants (USD 1300), 2022
- Ross-Lynn fellowship, Purdue University, 2021-2022.
- Top Graduate Tutors for AY2019/20 (SGD 100), Department of Mathematics, NUS.
- 2020 Thirty-fourth AAAI Conference Scholarship (USD 100).
- 2015-2016 Samsung Scholarship (CNY 5000), awarded by Samsung.
- 2013-2014 National Scholarship (CNY 8000), awarded by Ministry of Education of China.
- 2013-2014, 2014-2015, 2015-2016 Outstanding Student Scholarship (CNY 2000), awarded by SYSU.

## INVITED PRESENTATION IN CONFERENCE AND WORKSHOPS

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- Solving PDEs on Unknown Manifolds with ML, AMS Sectional meeting, Purdue University, March 2022
- Solving PDEs on Unknown Manifolds with ML, Joint Mathematics Meetings, Seattle WA, Jan 2022
- Solving PDEs on Unknown Manifolds with Machine Learning, 4th Annual Meeting of the SIAM Texas-Louisiana Section, UTRGV, South Padre Island, Texas, Nov 2021,
- Solving PDEs on Unknown Manifolds with Machine Learning, SIAM Southeastern Atlantic Section Conference, Auburn University, Sep 2021
- Solving PDEs on Unknown Manifolds with Machine Learning, IMA Workshop on the Mathematical Foundation and Applications of Deep Learning, Purdue University, Aug 2021
- DIANet: Dense-and-Implicit Attention Network, Conference on “Thirty-Forth AAAI Conference on Artificial Intelligence”, New York USA, February, 2020.
- Instance Enhancement Batch Normalization: An Adaptive Regulator for Batch Noise, Conference on “Thirty-Forth AAAI Conference on Artificial Intelligence”, New York USA, February, 2020.
- Regularization Methods of Deep Learning for Image Classification, Workshop on “High-Dimensional Learning and Computation in Physics”, National University of Singapore, Singapore, June, 2019.

## PROGRAMMING SKILLS

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- **Languages:** Python (PyTorch, TensorFlow), MATLAB, L<sup>A</sup>T<sub>E</sub>X

## CONTRIBUTED PACKAGES

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- **Self-attention Network for Image Classification** [\[Repository\]](#)
  - **Description:** in this repository, we collect some popular and effective attention models used to boost the performance of neural networks on image classification. For example, DIANet, IEbN, EAN.

## ACADEMIC SERVICE

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- **Service**
  - **Conference Reviewer:**  
2022, 2021 Conference on Computer Vision and Pattern Recognition;  
2021 AAAI Conference on Artificial Intelligence;  
2021 International Conference on Artificial Neural Networks;  
2020 Conference on Mathematical and Scientific Machine Learning.
  - **Journal Reviewer:**  
Journal of Scientific Computing (JOMP).
  - **Organizer:**  
AMS Sectional meeting, Purdue University, March 2022;  
4th Annual Meeting of the SIAM Texas-Louisiana Section, Nov 2021.
  - **Assistant:**  
IMA Workshop on the Mathematical Foundation and Applications of Deep Learning, Purdue University, Aug 2021.