# Jinshu Huang

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Research interests: Deep learning theory, imaging inverse problems

## EDUCATIOON

### Ph.D candidate in Computational Mathematics 2022.09 - present

School of Mathematical Sciences, Nankai University, Tianjin, China

**Awards:**

- Jiang Lifu Outstanding Student Special Award (2024)
- Honorable Mention in IMC Challenge powered by "Huawei" (2024)

### Master in Computational Mathematics 2019.09 – 2022.06

School of Mathematical Sciences, Nankai University, Tianjin, China

**Awards:**

- First-class of Nankai University Public Scholarship (2020,2021)

### Bachelor of Applied Mathematics 2015.09 - 2019.06

School of Mathematics and Statistics, Lanzhou University, Lanzhou, China

**Awards:**

- National Encouragement Scholarship (2016, 2017)
- Outstanding graduates

## PUBLICATIONS & PREPRINTS

- **Huang J**, Sun M, Wu C. Continuous-Time Perspectives on Deep Learning: Dynamical Systems and Generalization Bounds. Under review, 2025.
- Liang J, **Huang J**, Sun M, Wu C. A Deep Layer Limit Analysis of Transformer. Under review, 2025.
- **Huang J**, Su H, Tai-X, Wu C. Mathematical Modeling and Convergence Analysis of Deep Neural Networks with Dense Layer Connectivities. Under review, 2024.
- **Huang J**, Gao Y, Wu C. On dynamical system modeling of learned primal-dual with a linear operator $\mathcal {K} $: stability and convergence properties[J]. Inverse Problems, 2024, 40(7): 075006.
- **Huang J**, Xie H, Wu C, et al. Union Label Smoothing Adversarial Training: Recognize Small Perturbation Attacks and Reject Larger Perturbation Attacks Balanced[J]. Future Generation Computer Systems, 2023, 148: 600-609.

## RESEARCH EXPERIENCE

### Research on Deep Learning Theory

(School of Mathematical Sciences, Nankai University – 2021.09 - present)

- Study the deep layer limit convergence properties for DNNs under the dynamical system approach. Analysis stability and convergence results of their corresponding discrete and continuous time neural network training problems.
- Develop the dynamical systems approach to deep learning from the perspective of generalization.

### Research on Adversarial Attack and Defense of Neural Networks

(School of Mathematical Sciences, Nankai University & Qian Xuesen Laboratory, China Academy of Space Technology – 2020.08 - 2021.08)

◇Proposed a new adversarial defensive training strategy to improve the robustness of deep neural networks.

## TEACHING EXPERIENCE

Teaching Assistant for undergraduate courses:

- ◇*Functional Analysis*. (2021.09-2022.01, 2023.09-2024.01)
- ◇*Ordinary Differential Equations*. (2022.09-2023.01)
- ◇*Optimization Method*. (2021.03-2021.07)

## SKILLS

- ◇Familiar with PYTHON and MATLAB
- ◇Proficient in reading English literature (College English Test-6)
- ◇Experienced in writing English papers

## ACTIVITIES & SOCIETIES

◇Participent of the 2023/2024 PKU Summer School on Applied Mathematics on machine learning theory courses, 2023.7/ 2024.7.

◇Participent of the 13th Biannual Conference of China Society for Computational Mathematics, 2023.7.15 – 2023.7.19.

◇Internship at Qian Xuesen Laboratory, China Academy of Space Technology (Beijing, China) on adversarial attack and defense in deep learning, 2020.08 - 2021.08.