

Feng Zhang

PhD student in Control Science and Engineering

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Research profile

Computational neuroscience and nonlinear dynamics, with a focus on mathematical models of brain rhythms across microscopic, mesoscopic and macroscopic scales. Research connects single-neuron oscillations, ephaptic coupling and network propagation with models of epileptiform EEG activity.

Education

Tianjin University

School of Electrical and Information Engineering

PhD in Control Science and Engineering (in progress)

September 2023 - present

Research area: computational neuroscience

Tianjin University

School of Mathematics

MSc in Mathematics

September 2020 - June 2023

Shanxi University

School of Mathematical Sciences

BSc in Mathematics and Applied Mathematics

September 2016 - June 2020

Research interests

Single-neuron dynamics. Multi-timescale oscillations and dendritic-somatic interactions in compartmental models of pyramidal neurons.

Network mechanisms. Ephaptic coupling, non-synaptic recruitment and the propagation of epileptiform waves.

EEG modeling. Neural mass models and their relationship to observed epileptiform activity. Parameter identification is an ongoing exploratory direction.

Methods and tools

Modeling: dynamical systems modeling and numerical simulation.

Data: EEG analysis and EDF processing.

Software: MATLAB, Python, LaTeX and XPPAUT.

AI-assisted coding: Codex and Claude Code.

Publications

Journal articles and conference papers

1. Feng Zhang, Meili Lu, Xile Wei. Epileptiform fast-slow compound waves in neural networks: Mechanisms of dendritic oscillations and non-synaptic recruitment. *Neurocomputing* 697, 134260 (2026).

doi:10.1016/j.neucom.2026.134260

2. Feng Zhang, Meili Lu, Xile Wei. A Dual-Component Epileptic EEG Model Coupling Fast Ictal Activity and Spike-Wave Discharges. *EMBC 2026*, 8134-8140 (2026).

Published; indexing pending.

3. Feng Zhang, Meili Lu, Xile Wei. Computational Modeling of Dendritic-Somatic Interactions Driven by Electric Field Polarization in Pyramidal Neurons. *2025 12th International IEEE/EMBS Conference on Neural Engineering (NER)*, 228-233 (2025).

doi:10.1109/ner61569.2025.11588966

4. Feng Zhang, Meili Lu, Xile Wei. Computational Modeling of Planar Epileptic Waves Under Ephaptic Coupling for Closed-Loop Stimulation. *2025 12th International IEEE/EMBS Conference on Neural Engineering (NER)*, 393-398 (2025).

doi:10.1109/ner61569.2025.11589098

5. Feng Zhang, Meili Lu, Xile Wei. Multi-timescale compound oscillations in pyramidal neurons: insights from a three-compartment model. *Nonlinear Dynamics* 113(2), 1685-1712 (2025).

doi:10.1007/s11071-024-10289-4

6. Feng Zhang, Xile Wei, Liangfu Lu. A multi-frame network model based on time-frequency analysis for epilepsy prediction. *2024 43rd Chinese Control Conference (CCC)*, 8262-8267 (2024).

doi:10.23919/cc63176.2024.10662334

7. Honghong Huang, Feng Zhang, Liangfu Lu, Xiaopeng Si. Review of Application of Neural Networks in Epileptic Seizure Prediction. *Journal of Frontiers of Computer Science & Technology* 17(11), 2543-2556 (2023).

doi:10.3778/j.issn.1673-9418.2302001

8. Liangfu Lu, Feng Zhang, Yubo Wu, Songnan Ma, Xin Zhang, Guangjian Ni. A multi-frame network model for predicting seizure based on sEEG and iEEG data. *Frontiers in Computational Neuroscience* 16, 1059565 (2022).

Liangfu Lu and Feng Zhang contributed equally and share first authorship.

doi:10.3389/fncom.2022.1059565

Manuscripts under review

Feng Zhang, Meili Lu, Xile Wei. Computational modeling of the fast-to-slow EEG rhythm transition across seizure evolution and postictal recovery.

Journal of Neural Engineering | Under review (second round).

Submitted 28 July 2026.

Feng Zhang, Meili Lu, Xile Wei. Multi-timescale interactions underlying the emergence and evolution of seizure dynamics.

Chinese Physics B | Under review (first round).

Submitted 16 August 2026.