Chengran **FANG**

Ph.D. student

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Education

University of Paris-Saclay — *Paris, France*

Applied Mathematics and Computer Science — *Oct. 2019 - Feb. 2023*

- Two papers accepted by NeuroImage and SIAM Journal on Applied Mathematics
- One paper submitted to Medical Image Analysis

Ecole Centrale de Lyon — *Lyon, France*

Engineering Degree — *Sept. 2015 - June 2017*

- Majors: Signal processing
- One paper accepted by IEEE Antennas and Wireless Propagation Letters

Beihang University — *Beijing, China*

Bachelor's Degree in Applied Mathematics & Master's Degree in Electrical Engineering — *Sept. 2012 - Sept. 2019*

- Majors: Mathematics, Electromagnetism

Open Source Projects

Neuron Module in SpinDoctor `https://github.com/SpinDoctorMRI/SpinDoctor/tree/Paper_NeuroImage_2020`

Fourier Potential Method `https://github.com/fachra/FourierPotential`

swc2mesh `https://github.com/fachra/swc2mesh`

NeuronSet `https://github.com/fachra/NeuronSet`

Publications

Diffusion MRI simulation of realistic neurons with SpinDoctor and the Neuron Module — *NeuroImage*

Chengran Fang, Van-Dang Nguyen, Demian Wassermann, Jing-Rebecca Li — *Nov. 15, 2020*

- allows the numerical simulation of the diffusion MRI signal arising from realistic neurons;
- provides to the public the constructed finite element meshes for a group of 36 pyramidal neurons and a group of 29 spindle neurons whose morphological descriptions were found in the neuron repository NeuroMorpho.Org;
- provides both whole neuron meshes as well as meshes of neuron component such as the soma and dendrite branches;
- is available to the public and in open source.

Fourier Representation of the Diffusion MRI Signal Using Layer Potentials — *SIAP*

Chengran Fang, Demian Wassermann, Jing-Rebecca Li — *Sept. 17, 2022*

- proposes a new method of the diffusion MRI signal based on the efficient evaluation of layer potentials;
- describes the mathematical framework and the numerical implementation of the new method;
- demonstrates the convergence of our method via numerical experiments and analyzes the errors linked to various model and simulation parameters;
- is available to the public and in open source.

A simulation-driven supervised learning framework to estimate brain microstructure using diffusion MRI — *Medical Image Analysis (submitted)*

Chengran Fang, Demian Wassermann, Jing-Rebecca Li — *Jan. 17, 2023*

- developed an open-source neuron mesh generator and constructed a large-scale neuron mesh dataset;
- improved the computational efficiency of numerical matrix formalism by a factor of ten using GPU computing;
- implemented a simulation-driven supervised learning framework for brain microstructure imaging and provided promising prototypes.