Motofumi Fushimi

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Education

The University of Tokyo

Ph.D. in Information Science and Technology — April 2018 – Present
Supervisor: Takaaki Nara
Research field: Medical Imaging

The University of Tokyo

M.S. in Information Science and Technology — April 2016 – March 2018
Supervisor: Takaaki Nara
Research field: Medical Imaging

The University of Tokyo

B.S. in Engineering — April 2012 – March 2016
Supervisor: Ayumu Matani
Research field: Brain Functional Measurement

Teaching Experience

Teaching Assistant

Exercises in Information Physics and Computing, The University of Tokyo — April 2020 – July 2020
Sensor and Measurement Experiments, The University of Tokyo — April 2016 – March 2017

Research Experience

Visiting Graduate Assistant, Weill Medical College of Cornell University, NY, USA — April 2019 – March 2020

Publications

Original Articles

[1] **Motofumi Fushimi**, and Takaaki Nara, "Three-Dimensional Magnetic Resonance Electrical Properties Tomography Based on Linear Integral Equation Derived from the Generalized Cauchy Formula," *Progress In Electromagnetics Research C*, vol. 105, pp. 147–169, 2020, URL: http://jpier.org/PIERC/pier.php?paper=20052101.

[2] **Motofumi Fushimi**, and Takaaki Nara, "Boundary Value-Free Magnetic Resonance Electrical Properties Tomography Based on the Generalized Cauchy Formula with the Complex-Derivative Boundary Condition," *Progress In Electromagnetics Research M*, vol. 96, pp. 1–8, 2020, URL: http://jpier.org/PIERM/pier.php?paper=20062202.

[3] **Motofumi Fushimi**, and Takaaki Nara, "A Boundary-Value-Free Reconstruction Method for Magnetic Resonance Electrical Properties Tomography Based on the Neumann-Type Integral Formula over a Circular Region," *SICE Journal of Control, Measurement, and System Integration*, vol. 10, no. 6, pp. 571–578, 2017, URL: https://doi.org/10.9746/jcmsi.10.571.

[4] Takaaki Nara, Tetsuya Furuichi, and **Motofumi Fushimi**, "An explicit reconstruction method for magnetic resonance electrical property tomography based on the generalized Cauchy formula," *Inverse Problems*, vol. 33, no. 10, p. 105005, 2017, URL: https://doi.org/10.1088/1361-6420/aa8414.

Review Articles

[5] Takaaki Nara, and **Motofumi Fushimi**, "Imaging the Electric Properties of Human Tissue with MRI," *Medical Imaging Technology*, vol. 38, no. 3, pp. 85–90, 2020, URL: https://doi.org/10.11409/mit.38.85. (In Japanese)

[6] **Motofumi Fushimi**, "Principles of Magnetic Resonance Imaging," *Journal of The Society of Instrument and Control Engineers*, vol. 58, no. 7, pp. 520–524, 2019, URL: https://doi.org/10.11499/sicejl.58.520. (In Japanese)

International Conferences

[7] **Motofumi Fushimi**, Thanh Nguyen, and Yi Wang, "Morphology Enabled Quantitative Conductivity–Susceptibility Mapping with B1 and B0 Estimation from Complex Multi-echo Gradient Echo Signal," *ISMRM 28th Annual Meeting*, Online, Aug. 2020.

[8] **Motofumi Fushimi**, Pascal Spincemaille, and Yi Wang, "Simultaneous Conductivity and Susceptibility Mapping from Multi-echo GRE Data by the Nonlinear Least Square Field Estimation on the Complex Signal Equation", *5th International Workshop on MRI Phase Contrast & QSM*, Seoul, Korea, Sep. 2019.

[9] **Motofumi Fushimi**, and Takaaki Nara, "An Explicit EPT Reconstruction Method Based on the Dbar Equation Incorporating Longitudinal Magnetic Field Variations," *ISMRM 27th Annual Meeting*, Montreal, QC, Canada, May. 2019.

[10] **Motofumi Fushimi**, and Takaaki Nara, "A suppression method of a spread of the spot-like artifact for EPT by zero-point adjusting of the electric field," *2nd International Workshop on MR-based Electrical Properties Tomography (IMEP2019)*, Utrecht, Netherlands, Mar. 2019.

[11] **Motofumi Fushimi**, and Takaaki Nara, "An Explicit Method for MR-Based Electrical Properties Reconstruction Free from Their Boundary Values," *ISMRM 26th Annual Meeting*, Paris, France, Jun. 2018.

[12] **Motofumi Fushimi**, and Takaaki Nara, "Magnetic Resonance Based Electrical Properties Reconstruction with Total Variation Regularization and Zero-point Control of Electric Fields," *The 40th PIERS*, Toyama, Japan, Aug. 2018.

[13] **Motofumi Fushimi**, and Takaaki Nara, "A Boundary-Value-Free Method for Reconstructing Electrical Properties Using MRI Based on the Neumann-Type Integral Formula," *SICE Annual Conference 2017*, pp. 898–902, Ishikawa, Japan, Sep. 2017.

And 13 other papers in International/Domestic Conferences (4: peer reviewed, 9: without peer review).
Full list available at https://fushimi1018.github.io/#publications.

Awards

- **Magna Cum Laude Merit Award**: 28th Annual Meeting, International Society for Magnetic Resonance in Medicien (2020)
- **Research Award**: 34th Sensing Forum, The Society of Instrument and Control Engineers (2017)
- **Research Award**: 2nd Workshop on Medical Imaging 2016, The Institute of Electronics, Information and Communication Engineers (2016)
- **Excellent Poster Award**: 33th Sensing Forum, The Society of Instrument and Control Engineers (2016)

Founding

- **Overseas Challenge Program for Young Researchers**: The Japan Society for the Promotion of Science, April 2019 – March 2020.
- **Research Fellowship for Young Scientists (DC1)**: The Japan Society for the Promotion of Science, April 2018 – March 2021.

Skills

Language

Japanese (Native)
English (Business)

Software

Experience in
FEM Simulation Tools: COMSOL Multiphysics, ANSYS
Design Tools: Adobe Photoshop CC, Illustrator CC, InDesign CC, Dreamweaver CC

Programming

Experience in: MATLAB, pwsh, bash, C#, F#

Research Field

Current research interest: quantitative material properties mapping of biological tissues using MRI.

Electric Tissue Properties Mapping

Proposed an explicit and stable method of reconstructing electrical properties (electric conductivity and dielectric permittivity) of biological tissues in MR-based electrical properties tomography (EPT).

Simultaneous Conductivity–Susceptibility Mapping

Proposed a simultaneous imaging method of electric conductivity and magnetic susceptibility from a single multi-echo gradient echo acquisition by combining electrical properties mappgin (EPT) and quantitative susceptibility mapping (QSM).

Mechanical Tissue Properties Mapping

Proposed an explicit and stable method of reconstructing mechanical properties (shear modulus and viscosity) of biological tissues in MR-based elastography (MRE).