Abstract Submitted
for the 4CS21 Meeting of
The American Physical Society

Non-Linear Optimization for Enhanced Parameter Retrieval in Magnetic Resonance Fingerprinting[1] JOHN LUNDSTROM, MEGAN E. POORMAN, Physical Measurement Laboratory, National Institute of Standards and Technology, Boulder, CO, ANDREW DIENSTFREY, Information Technology Laboratory, National Institute of Standards and Technology, Boulder, CO, KATHRYN E. KEENAN, Physical Measurement Laboratory, National Institute of Standards and Technology, Boulder, CO — Quantitative Magnetic Resonance Imaging (qMRI) is emerging as a critical tool in medical diagnostics. Methods for qMRI demand long scan times to provide high-quality quantitative maps. Magnetic Resonance Fingerprinting (MRF) is a novel method for simultaneous multi-parametric qMRI, which is five times faster and feasibly more accurate than traditional qMRI methods. The current MRF analysis pipeline uses dictionary matching to infer MR parameters. The algorithm compares under-sampled MRI data to a model-based dictionary of unique MR parameter combinations; quantitative MRF maps are determined by the closest match. A discrete table of parameter values constrains dictionary matching, whereas in reality, these values are continuous. To improve conventional dictionary based MRF, we add non-linear optimization (NLO) with the goal of obtaining more precise and accurate parameter results. We determine the robustness of NLO with respect to initial condition and noise using a Monte Carlo simulation and obtain novel results, which quantify the error associated with NLO. Estimating uncertainty will improve understanding of MRF function and its utility in a clinical setting.

[1]NIST Summer Undergraduate Research Fellowship

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Date submitted: 10 Sep 2021 Electronic form version 1.4