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Bi-level iterative regularization for inverse problems in nonlinear PDEs

Tuesday, August 13, 2024 4:30 PM (30 minutes)

We investigate the ill-posed inverse problem of recovering unknown spatially dependent parameters in nonlinear evolution PDEs. We propose a bi-level Landweber scheme, where the upper-level parameter reconstruction embeds a lower-level state approximation. This can be seen as combining the classical reduced setting and the newer all-at-once setting, allowing us to, respectively, utilize well-posedness of the parameter-to-state map, and to bypass having to solve nonlinear PDEs exactly. Using this, we derive stopping rules for lower- and upper-level iterations and convergence of the bi-level method. We discuss application to parameter identification for the Landau-Lifshitz-Gilbert equation in magnetic particle imaging.

Author: NGUYEN, Tram (Max Planck Institute for Solar System Research)

Presenter: NGUYEN, Tram (Max Planck Institute for Solar System Research)

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