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comfos-nasc2026@math.upd.edu.ph

Reduced inverse Born series for the diffusion equation

Manabu Machida

Department of Informatics, Faculty of Engineering, Kindai University

*contact: machida@hiro.kindai.ac.jp

Inverse problems are solved by different methods. Optimization approaches iteratively minimize the distance between observed data and the solution to the forward problem. These methods often suffer from being trapped in a local minimum and from the computational cost of iteration. An alternative approach is to use perturbation theory. Perturbation of a coefficient of an equation can be determined from boundary values of the solution to the equation using the inverse Born series. Unlike the (first) Born approximation, the inverse Born series does not require linearization of nonlinear inverse problems (Moskow and Schotland, "Inverse Born series", in *The Radon Transform* (2019)). The inverse Born series obtains the solution to the inverse problem as an explicitly computable functional of the scattering data. This functional can be expressed in terms of the Green's function for the underlying partial differential equation.

In this talk, I will show that many terms in the inverse Born series approximately cancel and an efficient computation is possible using the reduced inverse Born series. This is joint work with Akari Ishida (Ishida and Machida, arXiv:2512.00423).

Keywords: inverse problems, inverse Born series, diffusion equation

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