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Large Iteratively Regularized Gauss-Newton Method with Parameter Decomposition

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bf Abstract

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mu for the exponentially ill-posed inverse problem in optical tomography. We validate our theoretical results using simulations for a one dimensional version of the optical tomography inverse problem. We conclude that the new method contributes greater flexibility for implementations of IRGN solutions of ill-posed inverse problems in which differing scales in physical space hinder standard IRGN inversions.

beginthebibliography[KLR73]

bibitem[A99]Arridge:review S.R. Arridge,

it Optical tomography in medical imaging: Topical Review, Inverse Problem,

bf 15 R41-R93, (1999).

bibitem[BK04]BK04 Bakushinsky, A. B., Kokurin, M.Yu.

it Iterative methods for Ill-Posed Operator Equations with Smooth Operators, Springer Dordrecht, Great Britain, (2004).

bibitem[BKA06]BKA06 Burger M., and Kaltenbacher B.,

it Regularizing NewtonKaczmarz Methods for Nonlinear Ill-Posed Problems, SIAM J. Num Anal.,

bf 44, 1, (2006) 153-182.

bibitem[KS05]khan:05 Khan, T. and Smirnova, A.,

it 1D inverse problem in diffusion based optical tomography using iteratively regularized Gauss-Newton algorithm, Applied Mathematics and Computation, Elsevier Science Inc.,

textbf161, 149-170, (2005).

bibitem[SAN05]SAN05 Schweiger M., Arridge S.R., and Nissila I.,

it Gauss Newton method for image reconstruction in diffuse optical tomography, Phys. Med. Biol.

bf 50 2365-2386, (2005).

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