



Einladung zum Oberseminar Wissenschaftliches Rechnen

Julius-Maximilians-Universität Würzburg
Lehrstuhl für Wissenschaftliches Rechnen IX

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Multilevel Preconditioning Strategies for Convex Optimisation Methods in Image Deblurring

Proximal gradient methods are widely used in imaging, and their speed of convergence can be accelerated by incorporating variable metrics and/or extrapolation steps. Recent works [1, 2] have shown that preconditioning strategies can significantly enhance this acceleration for image deblurring problems. In parallel, a multilevel framework has been introduced in [3] to speedup inertial and inexact forward-backward schemes for image restoration problems. In this talk, we combine preconditioning and multilevel strategies to design a robust and consistent acceleration framework for both standard and inexact forward-backward schemes applied to regularized convex optimization problems. Numerical experiments in image deblurring confirm that our approach yields a substantial improvement in convergence speed compared to standard methods. Joint work with S. Aleotti, C. Binda, and R. Krause

References

- [1] S. Aleotti, M. Donatelli, R. Krause, G. Scarlato, *A Preconditioned Version of a Nested Primal-Dual Algorithm for Image Deblurring*. *Journal of Scientific Computing* (2025) 103, Article 85.
- [2] S. Aleotti, S. Bonettini, M. Donatelli, M. Prato, S. Rebegoldi, *Nested Primal-Dual Iterated Tikhonov Method for Regularized Convex Optimization*. *Computational Optimization and Applications* (2025) 91, 357–395.
- [3] G. Lauga, E. Riccietti, N. Pustelnik, P. Gonçalves, *IML FISTA: A Multilevel Framework for Inexact and Inertial Forward-Backward*. *Application to Image Restoration*. *SIAM Journal on Imaging Sciences* (2024) 17(3).36

Ort: Raum 30.02.003 (Mathematik West, Emil-Fischer-Str. 30)

Zeit: Fr. 17.07.2026, 10:00 Uhr

Zu diesem Vortrag laden wir Sie herzlich ein.
You are cordially invited to this lecture.

gez. Prof. Dr. Alfio Borzi
gez. Prof. Dr. Frank Werner