Hauptvortrag/Plenary lecture

Mittwoch/Wednesday, 9:00, Wolfgang-Paul-Hörsaal

Jacobian-free Optimization

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Most classical and modern algorithms for nonlinear numerical optimization are based on the assumption that the gradients of the active constraint equations can be evaluated exactly or approximated by divided differences. Moreover, the rectangular matrix formed by these active constraint gradients needs to be directly factorized at each new iterate if one employs sequential quadratic programming or interior point methods.
In view of large problem dimensions we develop strategies to avoid evaluating and factorizing Jacobians by either low-rank updating or by employing essentially matrix-free fixed point solvers. In the talk we motivate these approaches, analyze their computational cost per cost, state their convergence properties and present numerical results from geophysical parameter estimation and aerodynamic shape optimization.