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Error Bounds, Critical Solutions and Numerical Methods for Smooth and Nonsmooth Optimization and Equilibrium Problems

Initiative: Trilaterale Partnerschaften – Kooperationsvorhaben zwischen Wissenschaftler(inne)n aus der

Ukraine, Russland und Deutschland

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An important issue of the project is the study of local error bounds and critical solutions of optimization and variational problems. Local Lipschitzian error bounds play the key role for the design and analysis of Newton-type methods with fast local convergence if the problem at hand has nonisolated solutions. Therefore, it is planend to extend the knowledge about conditions for the existence of error bounds for new problem classes. This will be a basis for the development of algorithmic techniques enabling local superlinear convergence in the case of nonisolated solutions. Research will rely on advanced mathematical tools, such as the theories of quadratic mappings and points of coincidence, which will also be developed within this project. Specifically, sufficient conditions for stability of the surjectivity property of a quadratic mapping will be studied, and then these results will be applied in order to derive inverse and implicit function theorems applicable at singular solutions of nonlinear equations. Moreover, it is expected to find conditions characterizing the structure of the set of coincidence points of two mapping. Along with Newton-type methods, it is also planned to study accelerated subgradient methods in the context of nonisolated solutions. First, the numerical behavior of existing modifications of r-algorithms and related subgradient methods for smooth and nonsmooth optimization problems with nonisolated solutions will be studied, including the development of reliable stopping criteria for such cases. Moreover, new subgradient methods with space transformation with provable geometric convergence (with respect to the localization volume) will be developed.

Projektbeteiligte

Prof. Dr. Andreas Fischer
Technische Universität Dresden
Institut für Numerische Mathematik
Dresden

Prof. Dr. Alexey Izmailov
Lomonosov Moscow State University
Faculty of Computational
Mathematics and Cybernetics
Department of Operations Research
Moscow
Russland

Dr. Petro Stetsyuk
National Academy of Sciences of Ukraine
Glushkov Institute of Cybernetics
Department of Nonsmooth Optimization Methods
Kiev
Ukraine

Prof. Dr. Aram Arutyunov
Peoples' Friendship University of Russia
Faculty of Science
Department of Nonlinear
Analysis and Optimization
Moskau
Russland