Universität Basel

Research Project

Analysis and numerics for Riesz minimal energy problems

Project funded by own resources

Project title Analysis and numerics for Riesz minimal energy problems
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Organisation / Research unit
Departement Mathematik und Informatik / Computational Mathematics (Harbrecht)
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Carl Friedrich Gauss investigated in the variational problem of minimizing the Newtonian energy evaluated in the presence of an external field, nowadays called the Gauss functional, over nonnegative charges on the boundary surface of a given domain. For this problem, later on the sign condition was given upin connection with boundary integral equation methods where distributional boundary charges had been introduced for solving boundary value problems. A different generalization of the original Gauss variational problem, maintaining the sign restriction but employing Borel or Radon measures as charges and replacing the Newtonian kernel by the much more general Riesz kernel has independently grown into an eminent branch of modernpotential theory. In this project, we analyze the related minimization problem and develop efficient techniques to numerically compute the solution.

Keywords Riesz kernel, energy minimization, variational problem
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Add publication

Published results

1172523, Harbrecht, H.; Wendland, W. L.; Zorii, N., On Riesz minimal energy problems, 0022-247X, Journal of mathematical analysis and applications, Publication: JournalArticle (Originalarbeit in einer wissenschaftlichen Zeitschrift)

2310323, Harbrecht, Helmut; Wendland, Wolfgang L.; Zorii, Natalia, Riesz minimal energy problems on Ck−1,1-manifolds, 0025-584X, Mathematische Nachrichten, Publication: JournalArticle (Originalarbeit in einer wissenschaftlichen Zeitschrift)

3611778, Harbrecht, Helmut; Wendland, Wolfgang L.; Zorii, Natalia, Rapid Solution of Minimal Riesz Energy Problems, 0749-159X ; 1098-2426, Numerical Methods for Partial Differential Equations, Publication: JournalArticle (Originalarbeit in einer wissenschaftlichen Zeitschrift)

4211073, Harbrecht, Helmut; Wendland, Wolfgang L.; Zorii, Natalia, Minimal energy problems for strongly singular Riesz kernels, 0025-584X ; 1522-2616, Mathematical News / Mathematische Nachrichten, Publication: JournalArticle (Originalarbeit in einer wissenschaftlichen Zeitschrift)

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