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zve všechny zájemce

na přednášku

On Riesz minimal energy problems on $C^{k-1,1}$-manifolds

kterou prosloví

Prof. Dr.-Ing. Wolfgang L. Wendland, Dr. h. c.

Universität Stuttgart

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❦

Jde o desátou přednášku konanou v rámci cyklu reprezentačních přednášek organizovaných na počest

prof. Eduarda Čecha,

jednoho z nejvýznamnějších českých matematiků novodobé historie a zakladatele Matematického ústavu AV ČR.

Pavel Krejčí, ředitel

On Riesz minimal energy problems on $C^{k-1,1}$-manifolds

The classical Gauss problem of minimizing the potential energy of a given conductor in $\mathbb{R}^n$, $n \geq 2$, is one of the basic problems modeling equilibrium states in electrostatics and more general physical phenomena. Here we study the constructive and numerical solution of minimizing the energy relative to the Riesz kernel $|x-y|^{\alpha-n}$, where $1 < \alpha < n$, for the Gauss variational problem, considered for finitely many compact, mutually disjoint, boundaryless $(n-1)$-dimensional $C^{k-1,1}$-manifolds Γ_l, $l \in L$, where $k > (\alpha-1)/2$, each Γ_l charged with Borel measures with the sign $\alpha_l := \pm 1$ prescribed. We show that the Gauss variational problem over a convex set of Borel measures can alternatively be formulated as a minimum problem over the corresponding set of surface distributions belonging to the Sobolev-Slobodetski space $H^{-\varepsilon/2}(\Gamma)$, where $\varepsilon := \alpha - 1$ and $\Gamma := \bigcup_{l \in L} \Gamma_l$. An equivalent formulation leads in the case of two manifolds to a nonlinear system of boundary integral equations involving simple layer potential operators on Γ. A corresponding numerical method is based on the Galerkin-Bubnov discretization with piecewise constant boundary elements. Wavelet matrix compression is applied to sparcify the system matrix. Numerical results are presented to illustrate the approach. Finally we present a concept how to extend the Riesz energy problem to the strongly singular case $-1 < \alpha < 1$.

MATEMATICKÝ ÚSTAV
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