INTERNATIONAL BIWEEKLY ONLINE SEMINAR ON ANALYSIS, DIFFERENTIAL EQUATIONS AND MATHEMATICAL PHYSICS

Coordinators: Prof. Alexey Karapetyants, Prof. Vladislav Kravchenko

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Recovery singularities in quasi-linear biharmonic operator

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The subject of this work concerns to the classical direct and inverse scattering problems that are considered for quasilinear operators. The operator is perturbed by first and zero order perturbations, which may be complex-valued and singular. For the direct scattering problems we show the existence of the scattering solutions in the Sobolev space $W_\infty^1(R^3)$. The inverse scattering problem can be formulated as follows: do the knowledge of the far field pattern uniquely determines (and how) the unknown coefficients of given differential operator? For linear perturbations of the biharmonic operator Saito's formula and uniqueness result, as well as the reconstruction of singularities, are obtained for these scattering problems (see [1], [2]). For quasilinear biharmonic operator on the line these results are proved in [3].

It turns out that the same results are true also for quasilinear perturbations of the biharmonic operator in multidimensional case.

Another result concerns to the kernel of the resolvent of the direct (linear) operator in $W_\infty^1(R^3)$ and corresponding reconstruction formula for the unknown coefficients of this linear perturbation.

References

[1] Tyni T. and Serov V., Scattering problems for perturbations of the multidimensional biharmonic operator, Inverse Problems and Imaging (2018), V. 12, pp. 205-227.
[2] Tyni T. and Harju M., Inverse backscattering problem for perturbation of biharmonic operator, Inverse Problems, (2017), V. 33, 105002.
[3] Tyni T. and Serov V., Inverse scattering problem for quasilinear perturbation of the biharmonic operator on the line, Inverse Problems and Imaging (2019), V. 13, pp. 159-175.

*Seminar website: https://msrn.sfedu.ru/sl. The seminar uses Microsoft Teams online platform.
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