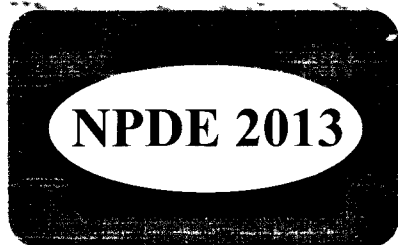


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EQUATIONS**

*dedicated to the 25th anniversary
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BOOK OF ABSTRACTS

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INDEFINITE SPECTRAL HYDRODYNAMIC PROBLEMS

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We study conservative and dissipative dynamical systems with infinite degrees of freedom that arise in evolution problems of linear hydrodynamics, and corresponding spectral problems.

In this problems the system motion near its equilibrium state is described by functional equations with values in a Hilbert space \mathcal{H} . Typically, the operator of the kinetic energy of the system is positive and bounded or compact in \mathcal{H} , and the operator of the potential energy of the system is self-adjoint and bounded from below in \mathcal{H} .

Because of the latter circumstances we use the functional spaces with an indefinite metric (space of M. Krein and space of L. Pontryagin, see [1-6]). This approach allows us to study the considered problems, in particular, to prove the propositions on solvability of them, to investigate their spectral properties and to get conditions of dynamic stability or instability of the considered dynamical systems.

Using this approach we consider some spectral problems that are generated by hydrodynamic problems of fluid mechanics [7-10]. Namely, the problems of the eigen-oscillations of a body with a cavity that is completely filled with an ideal fluid, the problem of the oscillations of a stratified fluid in a cylindrical container, the problem of the normal oscillations of a heavy viscous fluid in an open vessel), the problem of the transverse vibrations of a viscoelastic rod with a weight at the end, the problem of the movements of the articulated gyrostats, the problem of small motion of a viscoelastic fluid, and the transmission problems are studied.

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ELLIPTIC PROBLEMS WITH HARDY POTENTIALS

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In this talk we discuss problems of the type

$$\Delta u + \frac{\mu}{\delta^2(x)} u = u^p$$

in a bounded smooth domain $\Omega \subset \mathbb{R}^n$. Here $\delta(x)$ is the distance of a point $x \in \Omega$ to the boundary. We are interested in the existence and the boundary behavior of positive solutions. The existence depends heavily on the value of μ . Because of the singularity the solution cannot be described arbitrarily on the boundary. In this context the solutions of the linear problem $\Delta h + \frac{\mu}{\delta^2(x)} h = 0$ play an essential role. The case $p > 1$ was studied in [1] and the case $0 < p < 1$ is a common project in progress with M.A. Pozio.

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