ABSTRACTS

E.R. Andriyanova

Estimates of decay rate for solution to parabolic equation with non-power nonlinearities

Abstract. We study the Dirichlet mixed problem for a class parabolic equation with double non-power nonlinearities in cylindrical domain $D = (t > 0) \times \Omega$. By the Galerkin approximations method suggested by Mukminov F.Kh. for a parabolic equation with double nonlinearities we prove the existence of strong solutions in Sobolev-Orlicz space. The maximum principle as well as upper and lower estimates characterizing powerlike decay of solution as $t \to \infty$ in bounded and unbounded domains $\Omega \subset R_n$ are established.

Keywords: parabolic equation, N-functions, existence of solution, estimate of decay rate of solution, Sobolev-Orlicz spaces.

V.N. Dilnyi

Splitting of some spaces of analytic functions

Abstract. For the Paley-Wiener space and the weighted Hardy spaces in the half-plane we consider problems on splitting a function into a sum of two, each being "large" only in their domain. For the first space the problem is solved completely, for the second we obtain sufficient conditions of solvability.

Keywords: weighted Hardy space, Paley-Wiener theorem, angular boundary values, splitting

K.P. Isaev, R.S. Yulmukhametov, A.A. Yunusov

Entire functions with fine asymptotic estimates for convex functions

Abstract. In the paper we propose an entire function such that the logarithm of its modulus asymptotically approximates the given subharmonic function $\widetilde{h}(\text{Re } z)$, where $\widetilde{h}$ is the Legendre transformation of a convex function $h(t)$ on $(-1; 1)$ with the property $\exp(h(t)) = o((1 - |t|)^n)$, $n \in \mathbb{N}$. Such functions have applications in the issues on representation by exponential series of functions in integral weighted spaces on the interval $(-1; 1)$ with the weight $\exp h(t)$. At that, better the approximation, a finer topology can be used for the representation by exponential series. For functions h obeying $(1 - |t|)^n = O(\exp(h(t)))$, $n \in \mathbb{N}$, the corresponding entire functions were constructed before. In the present paper we consider the functions satisfying $\exp(h(t)) = o((1 - |t|)^n)$, $n \in \mathbb{N}$. In the suggested construction we take into consideration the necessary conditions for the distribution of exponents for the exponentials in the unconditional bases obtained in previous works. This is why the main result of the paper (Theorem 1) should be treated not as a tool for constructing unconditional bases but as an argument supporting the absence of such bases.

Keywords: entire functions, subharmonic function, Riesz measure, Hilbert space, Riesz bases.

L.A. Kalyakin

Phantom asymptotic solutions

Abstract. We provide some examples of the problems with small parameter which have formal asymptotic solutions associated with no exact solutions.
Keywords: Small parameter, asymptotics.

L.M. Kozhevnikova, A.A. Khadzhi

Boundedness of solutions to anisotropic second order elliptic equations in unbounded domains

Abstract. In the paper we study a class of anisotropic second order elliptic equations represented by the model equation

$$\sum_{\alpha=1}^{n} (|u_{x_\alpha}|^{p_\alpha-2} u_{x_\alpha})_{x_\alpha} = \sum_{\alpha=1}^{n} (\Phi_\alpha(\mathbf{x}))_{x_\alpha}, \quad p_n \geqslant \ldots \geqslant p_1 > 1.$$

We prove the boundedness of solutions to the homogeneous Dirichlet problem in unbounded domains located along one of the coordinate axes. We also establish an estimate for the solutions to the considered equations with a compactly supported right hand side that ensures a power decay of the solutions at infinity.

Keywords: Dirichlet problem, anisotropic elliptic equation, unbounded domain, boundedness of solutions, decay of solution.

M.V. Plekhanova, V.E. Fedorov

On control of degenerate distributed systems

Abstract. We study the control of linear distributed control systems described by differential equations in Banach spaces with a degenerate operator at the derivative. A homogeneous part of equations has a degenerate strongly continuous resolving semigroup. For such system with generally speaking time-dependent bounded operator at the control function we find the criteria of the ε-control for time T and of the ε-control in for a free time in terms of the operators involved in the equation. General results are used for studying of the ε-control of the considered systems with a finite-dimensional input. The obtained conditions are demonstrated by examples of control systems described by partial differential equations and systems of equations unsolved with respect to the time derivative.

Keywords: control system, degenerate evolution equation, Sobolev type equation, control

S.V. Khabirov

Optimal system for the sum of two ideals admitted by the hydrodynamic type equations

Abstract. We introduce the rules for constructing the optimal system of the dissimilar subalgebras for the sum of two ideals for which the optimal systems are known. As a result, we give the dissimilar subalgebra for five not yet considered Lie algebra admitted by the hydrodynamic type equations. It completes the listing of the subalgebras for the Lie algebras in the group classification of the gas dynamic models by the state equation.

M.G. Yumagulov, D.A. Yakshibaeva

Study of main scenarios of bifurcation for functional differential time-delay equations

Abstract. In the paper, we study the main bifurcation scenarios for functional differential time delay equations with periodic right side and for nonlinear autonomous equations with aftereffect. The main tool is the operator method for studying multi-parameter bifurcation leading us to new sufficient bifurcation conditions and allowing us to obtain the approximate formulae for appearing solutions. As applications, we consider the problems on bifurcation points for the modifications of Duffing equation and Hutchinson-Wright equation.

A.O. Kuryliak, O.B. Skaskiv, O.V. Zrum

Levy's phenomenon for entire functions of several variables

Abstract. For entire functions $f(z) = \sum_{n=0}^{+\infty} a_n z^n$, $z \in \mathbb{C}$, P. Lévy (1929) established that in the classical Wiman's inequality $M_f(r) \leqslant \mu_f(r)(\ln \mu_f(r))^{1/2+\varepsilon}$, $\varepsilon > 0$, which holds outside a set of finite logarithmic measure, the constant $1/2$ can be replaced almost surely in some sense by $1/4$; here $M_f(r) = \max\{|f(z)| \colon |z| = r\}$, $\mu_f(r) = \max\{|a_n|r^n \colon n \geqslant 0 \ r > 0$. In this paper we prove that the phenomenon discovered by P. Lévy holds also in the case of Wiman's inequality for entire functions of several variables, which gives an affirmative answer to the question of A. A. Goldberg and M. M. Sheremeta (1996) on the possibility of this phenomenon.

N.B. Sokulska

Description of zero sequences for holomorphic and meromorphic functions of finite λ-type in a closed half-strip

Abstract. We describe the zero sets of holomorphic and meromorphic functions f of finite λ-type in a closed half-strip satisfying $f(\sigma) = f(\sigma + 2\pi i)$ on the boundary.