

## ABSTRACTS

**N.F. Abuzyarova**

CLOSED SUBMODULES IN THE MODULE OF ENTIRE FUNCTIONS OF EXPONENTIAL TYPE  
AND POLYNOMIAL GROWTH ON THE REAL AXIS

**Abstract.** In the work we consider a topological module  $\mathcal{P}$  of entire functions, which is the isomorphic image under the Fourier-Laplace transform of Schwarz space  $\mathcal{E}'$  of distributions compactly supported in a finite or infinite interval  $(a; b) \subset \mathbb{R}$ . We study some properties of closed submodules in module  $\mathcal{P}$  related with local description problem. We also study issues on duality between closed submodules in  $\mathcal{P}$  and subspaces in the space  $\mathcal{E} = C^\infty(a; b)$  invariant w.r.t. the differentiation.

**Keywords:** entire functions, Fourier-Laplace transform, local description of submodules, invariant subspaces, spectral synthesis, finitely generated submodules.

**N.N. Aitkuzhina, A.M. Gaisin**

K-ORDER ESTIMATE FOR DIRICHLET SERIES IN A HALF-STRIP

**Abstract.** We study Dirichlet series converging only in a half-plane and whose sequence of exponents can be extended to some “right” sequence. We establish the best possible k-order estimates for the sum of the Dirichlet series in the half-strip whose width depends on a special distribution density of the exponents.

**Keywords:** k-order of the Dirichlet series in a half-strip, entire functions of a given growth on the real

**E.R. Andriyanova, F.Kh. Mukminov**

EXISTENCE OF SOLUTION FOR PARABOLIC EQUATION WITH NON-POWER NONLINEARITIES

**Abstract.** We consider the first mixed problem for a class of parabolic equation with double non-exponential nonlinearities in a cylindrical domain  $D = (t > 0) \times \Omega$ . By Galerkin’s approximations we prove the existence of strong solutions in Sobolev-Orlich space.

**Keywords:** parabolic equation,  $N$ -functions, existence of solution, Sobolev-Orlich spaces.

## V.M. Bruk

### INVERTIBILITY OF LINEAR RELATIONS GENERATED BY INTEGRAL EQUATION WITH OPERATOR MEASURES

**Abstract.** We investigate linear relations generated by an integral equation with operator measures on a segment in the infinite-dimensional case. In terms of boundary values, we obtain necessary and sufficient conditions

We consider integral equation with operator measures on a bounded closed interval in the infinite-dimensional case. In terms of boundary values, we obtain necessary and sufficient conditions under which these relations  $S$  possess the properties:  $S$  is closed relation;  $S$  is invertible relation; the kernel of  $S$  is finite-dimensional; the range of  $S$  is closed;  $S$  is continuously invertible relation and others. The results are applied to a system of integral equations becoming a quasidifferential equation whenever the operator measures are absolutely continuous as well as to an integral equation with multi-valued impulse action.

**Keywords:** integral equation, operator measure, Hilbert space, linear relation, spectrum, quasiderivative, impulse action.

## I.V. Verevkin

### GENERALIZED SOLUTIONS AND EULER-DARBOUX TRANSFORMATIONS

**Abstract.** We introduce Euler-Darboux transformation for non-homogeneous differential equations with the right-hand side being a generalized function. As an example, we construct the fundamental solutions for Klein-Gordon-Fock and Schrödinger equations with variable coefficients describing a particle in external scalar field.

**Keywords:** Euler-Darboux transformation, Klein-Gordon-Fock equation, Schrödinger equation, fundamental solution.

## M.V. Dontsova

### NONLOCAL SOLVABILITY CONDITIONS FOR CAUCHY PROBLEM FOR A SYSTEM OF FIRST ORDER PARTIAL DIFFERENTIAL EQUATIONS WITH SPECIAL RIGHT-HAND SIDES

**Abstract.** We consider a Cauchy problem for a system of two quasilinear first order partial differential equations with special right-hand sides. We obtain the conditions of a nonlocal solvability of this Cauchy problem. The study of the nonlocal solvability of the Cauchy problem for a system of two quasilinear differential equations with special right-hand sides is based on the method of an additional argument. The proof of the nonlocal resolvability of the Cauchy problem for a system of two quasilinear first order partial differential equations with special right-hand sides relies on global estimates.

**Keywords:** first order partial differential equations, Cauchy problem, the method of an additional argument.

**I.A. Kaliev, A.A. Shukhardin, G.S. Sabitova**

BOUNDARY VALUE PROBLEMS FOR EQUATIONS OF VISCOUS HEAT-CONDUCTING GAS  
IN TIME-INCREASING NON-CYLINDRICAL DOMAINS

**Abstract.** In this paper we prove the global solvability of the initial-boundary value problems for the complete system of equations describing one-dimensional non-stationary flow of the viscous heat-conducting gas in time-increasing non-cylindrical domains. Local existence and uniqueness of these problems are proved in earlier articles by Kazhikhov A.V. and Kaliev I.A. This is why, the proof of the global in time existence and uniqueness theorem is connected with obtaining a priori estimates, in which the constant depend only on the data of the problem and the value of the time interval  $T$ , but do not depend on the period of existence of a local solution. The study is made in terms of Eulerian variables.

**Keywords:** Navier-Stokes equations system, heat-conducting gas, global solvability, time-increasing non-cylindrical domains.

**M.E. Muminov, A.M. Khurramov**

SPECTRAL PROPERTIES OF TWO PARTICLE HAMILTONIAN ON ONE-DIMENSIONAL LATTICE

**Abstract.** We consider a system of two arbitrary quantum particles on a one-dimensional lattice with special dispersion functions (describing site-to-site particle transport), where the particles interact by a chosen attraction potential. We study how the number of eigenvalues of the family of the operators  $h(k)$  depends on the particle interaction energy and the total quasimomentum  $k \in \mathbb{T}$  (where  $\mathbb{T}$  is a one-dimensional torus). Depending on the particle interaction energy, we obtain conditions for existence of multiple eigenvalues below the essential spectrum of operator  $h(k)$ .

**Keywords:** two-particle Hamiltonian on one dimensional lattice, eigenvalue, multiple eigenvalue.

**I.Kh. Musin, M.I. Musin**

ON FOURIER TRANSFORMATION OF A CLASS OF ENTIRE FUNCTIONS

**Abstract.** We consider a space of entire functions of several complex variables decaying fast on  $\mathbb{R}^n$  and such that their growth along  $i\mathbb{R}^n$  is majorized by means of a family of weight functions. Under certain assumptions for the weight functions we obtain an equivalent description of this space in terms of estimates for partial derivatives of the functions in  $\mathbb{R}^n$  and prove a Paley-Wiener type theorem.

**Keywords:** Gelfand-Shilov spaces, Fourier transform, entire functions, convex functions.

**B.N. Khabibullin**

HELLY'S THEOREM AND SHIFTS OF SETS. II. SUPPORT FUNCTION,  
EXPONENTIAL SYSTEMS, ENTIRE FUNCTIONS

**Abstract.** Let  $\mathcal{S}$  be a family of sets in  $\mathbb{R}^n$ ,  $S$  be the union of all these sets and  $C$  be a convex set in  $\mathbb{R}^n$ . In terms of support functions of sets in  $\mathcal{S}$  and set  $C$  we establish necessary and sufficient conditions under which a parallel shift of the set  $C$  covers set  $S$ . We study independently the two-dimensional case, when sets are unbounded, by employing additional characteristics of sets. We give applications of these results to the problems of incompleteness of exponential systems in function spaces.

**Keywords:** convex set, system of linear inequalities, shift, support function, incompleteness of exponential systems, indicator of entire function

**A.R. Khashimov, S. Yakubov**

ON SOME PROPERTIES OF CAUCHY PROBLEM FOR NON-STATIONARY THIRD ORDER  
COMPOSITE TYPE EQUATION

**Abstract.** In the paper we construct a solution to the Cauchy problem for a non-stationary third order composite type non equation and we study some of its properties.

**Keywords:** Cauchy problem, third order equations, non-stationary PDE, Airy functions, increasing at infinity solutions.