ABSTRACTS

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An operator method for approximately studying regular bifurcation in multiparameter dynamical systems

Abstract. A new operator method for studying a large class of bifurcation problems with multidimensional degenerations considered. The method makes it possible to detect bifurcation parameter values; it leads to an iteration procedure and asymptotic formulas for approximately problems depending on many parameters. Applications to the theory dynamical systems are discussed: in problems about bifurcation of the fixed points, forced oscillations and self-oscillations.

Keywords: Bifurcation, dynamic systems, the operational equations, parameter functionalization, asymptotic formulas.

I.I. Golichev

On uniqueness and iteration method of solving of one non-linear non-stationary problem with non-local boundary conditions of «radiation heat transfer» type

Abstract. The iterative process of solution of non-linear initial boundary problem with non-local boundary conditions is constructed. In particular, such problems are widely used for modeling of radiative transfer processes. The constructed iterative process converges from any initial approximation.
The uniqueness of solution and the iterative process convergence is proved under conditions of smooth solution existence.
At each step of iterative process the linear initial boundary problem with third boundary condition is solving. The estimate of rate of iterative process convergence is obtained, as well as a priori estimates that are necessary for the iterative process construction.

Keywords: non-local boundary conditions, radiation heat transfer, iterative solution.

N.A. Zheltukhina, A.U. Sakieva, I.T. Habibullin

Characteristic Lie algebra and Darboux Integrable Discrete Chains

Abstract. Differential-difference equation

$$\frac{d}{dx}t(n+1,x) = f(x, t(n,x), t(n+1,x), \frac{d}{dx}t(n,x))$$

with unknown $t(n,x)$ depending on continuous and discrete variables x and n is studied. We call an equation of such kind Darboux integrable, if there exist two functions (called integrals) F and I of a finite number of dynamical variables such that $D_xF = 0$ and $DI = I$, where D_x is the operator of total differentiation with respect to x, and D is the shift operator: $Dp(n) = p(n+1)$. It is proved that

the equation is Darboux integrable if and only if its characteristic algebras in both directions are of finite dimension. The structure of the integrals is described. For a class of integrable equations the corresponding algebras are presented.

Keywords: integrable chains, classification, x-integral, n-integral, characteristic Lie algebra, integrability conditions.

V.E. Kim

Completeness of systems of derivatives of Airy functions and hypercyclic operators

Abstract. We study a problem of construction of new classes of hypercyclic operators on the space of all entire functions with the topology of uniform convergence on compact sets of the complex plane. This problem is closely related with the problem of completeness of some system of entire functions. It is proved in the paper that a system of successive derivatives of any non-zero solution of the Airy differential equation is complete in the space of all entire functions. This result is applied to the description of the new classes of hypercyclic differential operators with polynomial coefficients associated with the Airy equation.

Keywords: entire functions, hypercyclic operators, Airy functions.

O.A. Krivosheyeva, A.S. Krivosheyev

The fundamental principle for invariant subspaces

Abstract. It is studied the problem of a fundamental principle for invariant subspaces under differentiation of functions analytic in a limited convex domain of complex plane. Earlier this problem was solved with one restriction on a multiplicity of eigenvalues of differentiation operators. In the work this restriction is taken off. Thus we give a complete solution of the fundamental principle problems for arbitrary non-trivial closed invariant dubspaces that are admit spectral synthesis in arbitrary limited convex domains.ions in convex domain.

Keywords: golomorphic function, convex domain, invariant subspace, fundamental principle.

R.Ch. Kulaev

About resolvability of a parabolic problem on the graph

Abstract. In work it is considered initial-boundary problem of parabolic type, set on the geometrical graph (a spatial network). It is supposed that equation factors satisfy on edges of the graph to a Helder condition on spatial and time variables. On border of the network non-uniform conditions of the first, second or third sort are laid down. In central points of the graph the equation decision satisfies to a transmission condition of derivatives and can have discontinuity. Thus it is supposed that factors from conditions on border and in knots of the graph satisfy to a H?lder condition on a time variable. The theorem of existence of a mixed problem is proved, giving solution representation through thermal potentials.

Keywords: graph, the differential equation on the graph, fundamental solution for the equation on the graph, a method of potential.

S.G. Merzlyakov

Right inverse of the convolution operator in the space of entire functions of exponential type

Abstract. In this note we consider this convolution operators in the space of entire functions of exponential type less than σ, $\sigma \leqslant \infty$. It is shown that a continuous linear right inverse to convolution operators exist if and only if the characteristic function of the operator has a finite number of zeros in the open disk with center zero and radius σ.

Previously, the existence of a continuous linear right inverse for a convolution operator has been studied in spaces of holomorphic functions in a convex domain, germs of holomorphic functions on convex compact sets of entire functions of order less than ρ, $\rho > 1$, and for the space of entire functions of exponential type not considered.

Keywords: convolution operator, right opposite, the space of entire functions of exponential type.

O.A. Sultanov

Lyapunov functions for nonautonomous systems close to Hamiltonian

Abstract. Non-autonomous perturbations of autonomous Hamiltonian systems with one degree of freedom are being considered at this work. The problem of stability of equilibrium position is being solved with the using of the second method of Lyapunov. Hamilton function of autonomous system is in the basis of Lyapunov functions. The conditions of stability of equilibrium position are being written in the factors of perturbations. Theorems about stability and unstability of answers are being proved. The received results are applied to the research of stability of Penleve equations answers.

Keywords: equilibrium, stability, Lyapunov function.

R.A. Sharipov

A counterexample to Khabibullin's conjecture for integral inequalities

Abstract. Khabibullin's conjecture for integral inequalities has two numeric parameters n and α in its statement, n being a positive integer and α being a positive real number. This conjecture is already proved in the case where $n > 0$ and $0 < \alpha \leqslant 1/2$. However, for $\alpha > 1/2$ it is not always valid. In this paper a counterexample is constructed for $n = 2$ and $\alpha = 2$. Then Khabibullin's conjecture is reformulated in a way suitable for all $\alpha > 0$.

Keywords: Khabibullin's conjecture, integral inequalities, integral transformations.