

ABSTRACTS

A.S. Aisagaliev, Zh.Kh. Zhunussova

TO THE SOLUTION OF A BOUNDARY VALUE PROBLEM WITH A PARAMETER
FOR AN ORDINARY DIFFERENTIAL EQUATIONS

Abstract. We propose a method for solving a boundary value problem with a parameter under the presence of phase and integral constraints. We obtain the necessary and sufficient conditions for the solvability of the boundary value problem with a parameter for ordinary differential equations. A method for constructing the solution to the boundary value problem with a parameter and constraints is developed by constructing minimizing sequences. The base of the proposed method for solving the boundary value problem is the immersion principle. The immersion principle is created by finding the general solution for a class of the first kind Fredholm integral equations. As an example, the solution of the Sturm-Liouville problem for a parameter value in a prescribed interval is given.

Keywords: immersion principle, optimization problem, minimizing sequences, integral equation, Sturm-Liouville problem

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ON THE PROBABILITY OF THE EVENT: IN n GENERALIZED ALLOCATION SCHEMES
THE VOLUME OF EACH CELL DOES NOT EXCEED r .

Abstract. We consider n identical generalized schemes of allocating particles in cells. We study the probability of the event: for each generalized allocation scheme, there are at most r particles in each cell, where r is a given number. We obtain an asymptotic estimate for this probability and we consider the application of the obtained results to an antinoise coding.

Keywords: generalized allocation scheme, Cauchy integral, Hamming code.

I.I. Golichev, T.R. Sharipov, N.I. Luchnikova

GRADIENT METHODS FOR SOLVING STOKES PROBLEM

Abstract. In the present paper we consider gradient type iterative methods for solving the Stokes problems in bounded regions. where the pressure serves as the control; they are obtained by reducing the problem to that of a variational type. In the differential form the proposed methods are very close to the algorithms in the Uzawa family. We construct consistent finite-difference algorithms and we present their approbation on the sequence of meshes for solving two-dimensional problem with a known analytic solution.

Keywords: Stokes problem, optimal control, gradient method, finite-difference scheme

I.A. Kaliev, S.T. Mukhambetzhano, G.S. Sabitova

NUMERICAL MODELING OF THE NON-EQUILIBRIUM SORPTION PROCESS

Abstract. Filtration in porous media of fluids and gases containing associated with them (dissolved, particulate) solid substances is accompanied by the diffusion of these substances and mass transfer between the liquid (gas) and solid phases. The most common types of mass transfer are sorption and desorption, ion exchange, dissolution and crystallization, mudding, sulfation and suffusion, waxing. We consider the system of equations modeling the process of non-equilibrium sorption. We formulate a difference approximation of the differential problem by the implicit scheme. The solution to the difference problem is constructed by the sweep method. Basing on the numerical results, we can conclude the following: as the relaxation time decreases, the solution to the with a decrease in the relaxation time of the non-equilibrium problem solution tends to the solution of the equilibrium problem as the time increases.

Keywords: system of equations of non-equilibrium sorption, difference approximation, implicit scheme, sweep method, numerical experiments.

F.Kh. Mukminov

UNIQUENESS OF THE RENORMALIZED SOLUTIONS TO THE CAUCHY PROBLEM FOR AN ANISOTROPIC PARABOLIC EQUATION

Abstract. We consider the Cauchy problem for a certain class of anisotropic parabolic second-order equations with double non-power nonlinearities. The equation contains an “inhomogeneity” in the form of a non-divergent term depending on the sought function and spatial variables. Non-linearities are characterized by N -functions, for which Δ_2 -condition is not imposed. The uniqueness of renormalized solutions in Sobolev-Orlich spaces is proved by the S.N.Kruzhkov method of doubling the variables.

Keywords: anisotropic parabolic equation, renormalized solution, non-power nonlinearities, N -functions, uniqueness of solution.

R. Pirov

ON COMPATIBILITY CONDITIONS AND MANIFOLDS OF SOLUTIONS TO ONE CLASS OF OVERDETERMINED SYSTEMS OF SECOND ORDER PARTIAL DIFFERENTIAL EQUATIONS

Abstract. In the work we consider a class of overdetermined system of second order partial differential equations with one unknown function involving one or two second order derivatives in the right hand side. We find the compatibility conditions and prove theorems on existence and uniqueness of solutions involving at most six arbitrary constants.

Keywords: overdetermined systems, compatibility conditions, manifolds of solutions, cross differentiation

T.F. Sharapov

ON RESOLVENT OF MULTI-DIMENSIONAL OPERATORS WITH FREQUENT ALTERNATION OF BOUNDARY CONDITIONS: CRITICAL CASE

Abstract. We consider an elliptic operator in a multi-dimensional domain with frequent alternation of Dirichlet and Robin conditions. We study the case, when the homogenized operator has Robin condition with an additional coefficient generated by the geometry of the alternation. We prove the norm resolvent convergence of the perturbed operator to the homogenized one and obtain the estimate for the rate of convergence. We construct the complete asymptotic expansion for the resolvent in the case, when it acts on sufficiently smooth functions.

Keywords: frequent alternation, homogenization, norm resolvent convergence, asymptotics

S.K. Datta, T. Biswas, P. Das

SOME RESULTS FOCUSING GENERALIZED RELATIVE ORDERS OF MEROMORPHIC FUNCTIONS

Abstract. In this paper we discuss some growth rates of compositions of entire and meromorphic functions on the base of generalized relative order and generalized relative lower order of meromorphic functions with respect to entire functions.

Keywords: meromorphic function, entire function, generalized relative order, generalized relative lower order, composition, growth.

L.S. Maergoiz

ON THE EXPANSION OF A MEROMORPHIC FUNCTION IN PARTIAL FRACTIONS

Abstract. The paper is devoted to the expansion in partial fractions for a meromorphic function of one complex variable. It contains the results by the author on representing a meromorphic function as a sum of an entire function and the principal parts in its Laurent expansion at its poles.

Keywords: expansion in partial fractions, reciprocal of entire function, meromorphic function, proximate order, indicator.

K. Zheltukhin

RECURSION OPERATOR FOR A SYSTEM WITH NON-RATIONAL LAX REPRESENTATION

Abstract. We consider a hydrodynamic type system, waterbag model, that admits a dispersionless Lax representation with a logarithmic Lax function. Using the Lax representation, we construct a recursion operator of the system. We note that the constructed recursion operator is not compatible with the natural Hamiltonian representation of the system.

Keywords: recursion operator, hydrodynamic type systems, non-rational Lax representation.