

ABSTRACTS

A.I. Abdalnagimov, A.S. Krivosheyev

PROPERLY DISTRIBUTED SUBSEQUENCE ON THE LINE

Abstract. In the article we consider first order sequences of complex numbers. We prove that a sequence of nonzero minimal density contains a subsequence of the same density. We also prove that a real sequence of nonzero minimal density contains a properly distributed subsequence. Basing on this fact, we prove a result on representation of an entire function of exponential type with real zeros as a product of two entire functions with the same properties. Moreover, one of these functions has a regular growth. As a corollary, we obtain a result on completeness of exponential systems with real exponents in the space of analytic functions in a bounded convex domain of the complex plane.

Keywords: entire function, regular growth, zero set

A.M. Akhtyamov, R.R. Kumushbaev

IDENTIFICATION OF A POLYNOMIAL IN NONSEPARATED BOUNDARY CONDITIONS
IN THE CASE OF A MULTIPLE ZERO EIGENVALUE

Abstract. In the work we discuss the problem of recovering the coefficients of a polynomial in spectral problems with nonseparated boundary conditions by one multiple zero eigenvalue and n of nonzero eigenvalues. The uniqueness theorem is proved.

Keywords: eigenvalues, boundary conditions, characteristic determinant.

Yu.Yu. Bagderina

EQUIVALENCE OF SECOND-ORDER ODES TO EQUATIONS
OF FIRST PAINLEVÉ EQUATION TYPE

Abstract. We consider equivalence problem for equations of a degenerate type, which involve, for example, the first Painlevé equation. In terms of algebraic and differential invariants of the family of equations with the cubic nonlinearity in the first-order derivative, we obtain the necessary condition of equivalence to some equations of this type with a known solution. We prove a criterion of equivalence to the first Painlevé equation under point transformations.

Keywords: first Painlevé equation, equivalence, invariant.

N.B. IslamovANALOGUE OF BITSADZE - SAMARSKII PROBLEM FOR A CLASS OF
PARABOLIC-HYPERBOLIC EQUATION OF SECOND KIND

Abstract. In this work we prove the unique solvability a Bitsadze-Samarskii type problem for a degenerate parabolic-hyperbolic equation of second kind, when on the first and second part of characteristics Bitsadze-Samarskii condition is imposed.

Keywords: degenerate parabolic-hyperbolic equation, equation of second kind, non-local problems, Bitsadze-Samarsky condition, unique solvability, extremum principle, Fredholm integral equation.

S.G. Merzlyakov, S.V. PopenovINTERPOLATION BY SERIES OF EXPONENTIALS IN $H(D)$ WITH REAL NODES

Abstract. In the space of holomorphic functions in a convex domain, we study a problem on interpolation problem by sums of the series of exponentials converging uniformly on compact subsets of the domain. The discrete set of multiple interpolation is located on the real axis in the domain and has the unique finite accumulation point. We obtain a criterion for solvability of the problem in terms of distribution of limit directions of exponents of exponentials at infinity.

Keywords: holomorphic function, convex domain, interpolation with multiplicities, series of exponentials, closed ideal, closed submodule, strong dual space, duality

O.A. Sultanov

STABILITY OF AUTORESONANCE IN DISSIPATIVE SYSTEMS

Abstract. We consider a mathematical model describing the initial stage of a capture into autoresonance in nonlinear oscillating systems with presence of a dissipation. Solutions whose amplitude increases unboundedly in time correspond to a resonance. An asymptotic expansion for such solutions is constructed as a power series with constant coefficients. The stability of autoresonance with respect to persistent perturbations is studied by means of Lapunov's second method. We describe the classes of perturbations for which a capture into autoresonance occurs.

Keywords: resonance, nonlinear oscillations, dissipation, perturbations, stability

I.D. Tsopanov

GENERAL FORMULAE OF REGULARIZED TRACES FOR LOADED EQUATIONS

Abstract. We consider regularized traces for differential operators so that the coefficients at the powers of a spectral parameter are values of an unknown function at a prescribed set of points in its domain. Such differential operators are interpreted as polynomial operator pencils whose coefficients are unbounded finite-dimensional operators. Basing on the theory of M.V. Keldysh, we construct general formulae for the regularized traces of such operator pencils. The obtained formulae develop a known result by V.A. Sadovnichii and V.A. Lyubishkin for relative finite-dimensional perturbations of self-adjoint operators.

Keywords: spectrum, operator pencil, regularized traces.

R.A. SharipovON A PROBLEM ASSOCIATED WITH APPROXIMATION
BY EXPONENTIAL FUNCTIONS

Abstract. While formalizing a certain problem of numeric signal processing there arises a mathematical problem on approximating a square integrable function defined on some finite interval of the real line by linear combinations of exponential functions. This problem is solved as an optimization problem by means of minimizing the root mean square deflection with respect to the coefficients of the linear combination and with respect to the exponents of the exponential functions. In some cases, when minimizing with respect to the exponents, a computational singularity occurs due to small denominators. In the present paper this singularity is shown to be removable and a mechanism of its removal is described.

Keywords: spectrum of a signal, approximation by exponential functions, root-mean-square deflection, small denominators.