

PREFACE

This issue of *Communications in Mathematical Analysis* is devoted to various aspects of Analysis, Operator Theory and their applications in problems of Mathematical Physics.

In particular, in this volume there are studied relations between the properties of the radial Toeplitz operators on the unit ball and of the sequences of their eigenvalues, the structure of the poly-Bergman type spaces on the Siegel domain, and the properties of two families of discrete q -extensions of the classical Chebyshev polynomials.

The following problems of mathematical physics are investigated. The spreading rate estimates of soliton perturbations for relativistic nonlinear wave equations are obtained, the existence of transmission eigenvalues for non-regular cases of the scattering problem for the Helmholtz equation is proved, the convergence of Galerkin's approximations for the regularized 3D periodic Navier-Stokes equations is established, the asymptotic behavior and stability of solutions to the barotropic vorticity equation on a sphere are studied.

Among of different topics of applications we refer to the formulation of the time-frequency integrals and the stationary phase method in problems of acoustic waves propagation, the numerical study of the behavior of the optical waves in quasi-periodic spherical structures, establishing a long time dynamics for nonlinear Hamilton system of a charged particle in the Klein-Gordon field, and others.

The existence of bang-bang controls with at most $n-1$ points of switching is established for a class of nonlinear n -dimensional control systems that can be mapped to linear ones by change of variables and an additive change of control. Finally, the asymptotics of European double-barrier option with compound Poisson component is studied.

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