

## Quasispectral Polynomials and their Applications

<sup>1</sup> *International University of Economics and Humanities named after academician Stepan Demianchuk, Rivne, Ukraine*  
E-mail: janchukp@ukr.net

We build quasi-spectral polynomials in 80th years of the last century and used them for solving boundary value problems for differential equations, Cauchy problem for systems of ordinary nonlinear equations and other problems. For example, we have simple formulas the Fourier quasispectral polynomial series for solutions Poisson equation with Dirichlet and Neumann boundary conditions. On the basis previously explored properties quasispectral polynomials of the first and second kinds and associated Fourier series [1,2] is constructed the algorithm to solving boundary value problem for the linearized Navier-Stokes equations

$$-\Delta v + \text{grad } p = F, \quad \text{div } v = G$$

on a parallelepiped with the Dirichlet boundary conditions for  $v$ . We received effective estimations of errors in  $L^2$  and uniform metrics.

- [1] P.S. Janchuk, *Proceedings of the Institute of Mathematics of the NAS of Ukraine*, **31**, (2000), P.201-214.
- [2] P.S. Janchuk, *Polynomial approximation of solutions to the Stokes boundary value problems [in Ukrainian], Volyn Mathematical Bulletin, Series Applied Mathematics*, **Vol. 10, (19)**, (2013), P. 180-192.
- [3] P.S. Janchuk, *On spectral method of approximate solution of Poisson's equation [in Ukrainian], Questions of applied mathematics and mathematical modeling, Dnipropetrovsk*, (2012), P.261-268.