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ICNDDE-2014

Recent Developments and Applications

May 27-30, 2014

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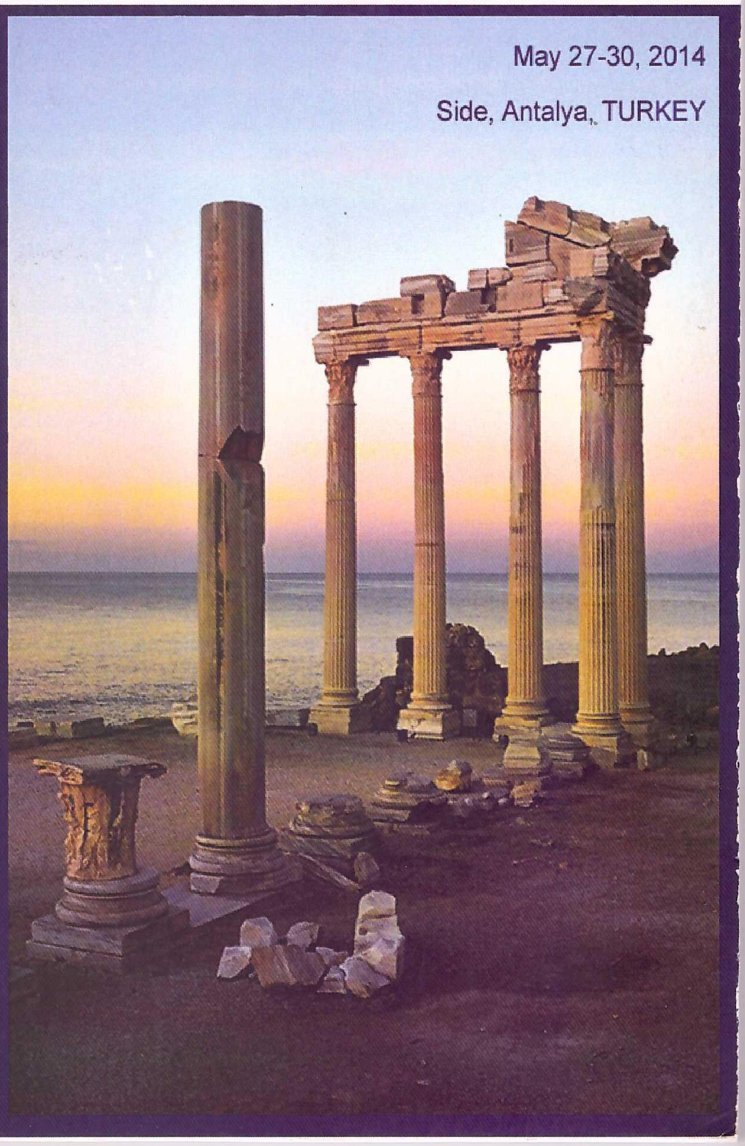

ABSTRACTS

International Conference on Nonlinear Differential and Difference Equations: Recent Developments and Applications (ICNDDE 2014), Antalya, Turkey, May 27-30, 2014.

On an effective method for the numerical solution of elliptic equations with discontinuous coefficients

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In this paper, the equation of elliptic type with strongly varying coefficients is considered. The equations of this type are obtained in the second step of the splitting method for solving the Navier-Stokes equations for a viscous incompressible fluid, atmospheric boundary layer in the areas of complex shape.

In [1] economic (with respect to number of actions) alternately triangular scheme of second-order accuracy for the numerical solution of elliptic equations is suggested. In [2] a modified alternate-triangular iterative method with Chebyshev parameters of the second order accuracy for the Dirichlet difference problem for an elliptic equation is built. In the V. Lebedev's monograph [3] the application of the method of composition for finding solutions for eigenvalue problems, time-dependent problems, the Dirichlet problem for the biharmonic equation and grid problems is considered. In [4] the difference stationary problem for the Poisson equation with piecewise constant coefficients in subdomains is studied.

In this paper a special method for the numerical solution of elliptic equations with strongly varying coefficients is proposed. The proposed method is based on special substitution of variables which reduces the problem with discontinuous coefficients of the second kind to a problem with discontinuous coefficients of the first kind. An iterative process with two parameters taking into account the ratio of the coefficients of the equation in subdomains is built. A theorem for the rate of convergence of the developed iterative process is proved. Computational algorithm and numerical calculations to illustrate the effectiveness of the proposed method are developed.

References

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[4] Volkov E.A. On methods for solving differential equations for a piecewise-homogeneous medium and the right part of the set along the curve. DAS USSR, 1965, T.161, No.2, P. 274-277.

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Existence of positive solutions for p-Laplacian impulsive boundary value problems

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In this paper, by using a fixed point theorem in a cone, we investigate the existence of positive solutions for a second-order p-Laplacian impulsive boundary value problem. As an application, an example is given to illustrate our main results.