

Numerical solution of the elliptic-Schrödinger equation with the multipoint nonlocal boundary condition

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Abstract: The boundary value problem for an elliptic-Schrödinger equation with the multipoint nonlocal boundary condition is considered. The stability estimates for the solution of the given problem are established. For numerically solving this multipoint nonlocal boundary problem the first and second order of difference schemes are presented. The theoretical statements for the solution of these difference schemes are supported by the result of numerical examples.

Keywords: finite difference equation, partial differential equation, stability

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REFERENCES

- [1] Ashyralyev, A., Fattorini, H. O., “On uniform difference scheme for second order singular perturbation problems in Banach spaces”, *SIAM J. Math. Anal.*, Vol.23, No.1, pp. 29-54, 1992.
- [2] Ashyralyev, A., Ozdemir, Y., “Stability of difference schemes for hyperbolic-parabolic equations”, *Comput. Math. Appl.*, Vol.50, pp. 1443-1476, 2005.
- [3] Ashyralyev, A., Ozdemir, Y., “On nonlocal boundary value problems for hyperbolic-parabolic equations”, *Taiwan. J. Math.*, Vol.11, No.4 pp. 1075-1089, 2007.
- [4] Ozdemir, Y., Kucukunal, M., “On nonlocal boundary value problems for hyperbolic Schrödinger equations”, *Abstr. Appl. Anal.*, Vol.2012, pp. 1-12, 2012.