

## AUTONOMOUS BOUNDARY-VALUE PROBLEM UNSOLVED WITH RESPECT TO THE DERIVATIVE IN THE CRITICAL CASE

We establish constructive necessary and sufficient conditions of solvability and propose a scheme for the construction of solutions of a nonlinear autonomous boundary-value problem unsolved with respect to the derivative [1,2,3] in the critical case.

We also construct convergent iterative schemes for finding approximations to the solutions of a nonlinear autonomous boundary-value problem unsolved with respect to the derivative. As examples of application of the obtained iterative schemes, we find approximations to the solutions of periodic boundary-value problems for Lienard-type equations unsolved with respect to the derivative [3].

The proposed procedure for the investigation of the conditions of solvability and the construction of solutions to autonomous boundary-value problems unsolved with respect to the derivative can be generalized to the case of autonomous boundary-value problems with impulsive influence [4].

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[2] *Boichuk O.A., Chuiko S.M.* Constructive methods for analysing boundary value problems of the theory of nonlinear oscillations. - Naukova Dumka. - Kyiv. -2023. - 232 p. (in Ukrainian).

[3] *Chuiko S., Chuiko O., Diachenko D.* On approximate solutions of a nonlinear periodic boundary-value problem with switching in the critical case of parametric resonance by the Newton-Kantorovich method // Journal of Mathematical Sciences. - 2024. - 279. - №3. - P. 438 - 453.

[4] *Samoilenko A.M., Boichuk A.A.* Linear noetherian boundary value problems for differential systems with an impulse action // Ukrainian Mathematical Journal. - 1992. - 44. - № 4. - P. 564 - 568.

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