

# Numerical Solution of Integro-algebraic Equations of Multistep Methods

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**Abstract:** In the report systems of integral equations are considered

$$A(t)x(t) + \int_0^t K(t,s)x(s)ds = f(t), 0 \leq s \leq t \leq 1, \quad (1)$$

where  $A(t)$  and  $K(t,s)$  are  $(n \times n)$  matrices,  $f(t)$  and  $x(t)$  are  $n$  dimensional given and desirable vector-functions with the condition

$$\det A(t) \equiv 0.$$

Such as problems are referred to as integro-algebraic equations.

In the report sufficient conditions of existence of unique continuous solution [1].

Usually, if we apply standard multistep methods for the problem (1) then we'll have an unstable process.

For numerical solutions of problem (1) we construct methods which are based on Adamss' quadrature formulas and on extrapolation formulas. They are of the form:

$$A_{i+1} \sum_{j=0}^k \alpha_j x_{i-j} + h \sum_{l=0}^i \omega_{i+1,l} K_{i+1,l} x_l = f_{i+1}.$$

The theorem of convergence of these methods and calculations of model examples are submitted in the report.

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## References

- [1] Chistyakov V.F. On Singular Systems of Ordinary Differential Equations and their Integral Analogue. Lyapunov Function and their Application. Novosibirsk: Nauka, 1987, p.231–239.

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