ABSTRACTS

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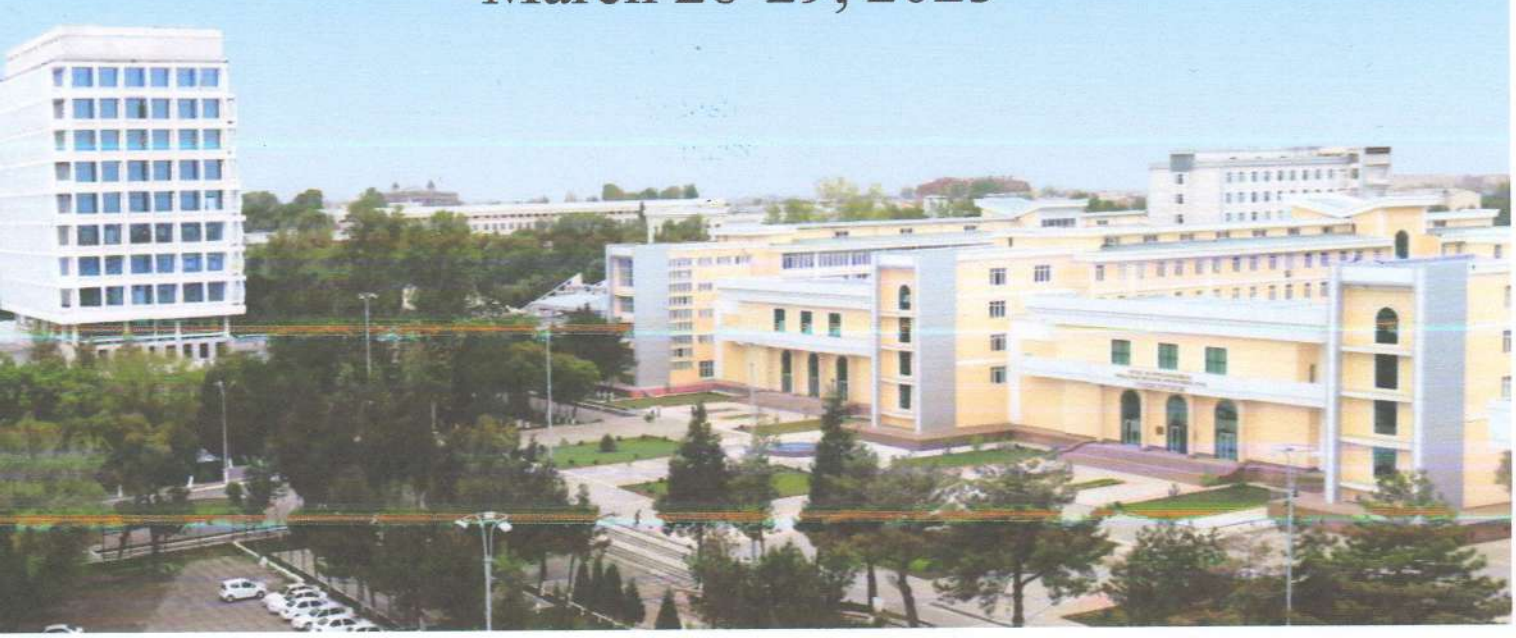

Ushbu dokladda quyidagi masala qaraladi: chegaraviy A va B to'plamlar yordamida aniqlangan W ko'rinishdagi to'plamlarning golomorflik qobig'ini topish mumkinmi? Golomorflik qobig'ini topish mumkin bo'lsa, u qanday ko'rinishga ega bo'ladi?

$A = D$ va $B = G$ bo'lgan eng sodda holda qo'yilgan masala 1906 yilda birinchi bo'lib F.Xartogsning fundamental teoremasi yordamida yechilgan (masalan [1] ga qarang). Agar $A \subset D$ va $B \subset G$ bo'lsa W to'plamning golomorflik qobig'ini topish masalasi 1976 yilda V.O.Zaxaryuta tomonidan hal etilgan. Boshqa umumiy chegaraviy hollarda esa, ya'ni $A \subset \overline{D}$ va $B \subset \overline{G}$ bo'lgan hollarda W to'plamning golomorflik qobig'ini topish masalalari A.A.Gonchar, E.M.Chirka, A.S.Sa-dullayev, S.A.Imomqulov, T.T.To'ychiyev va boshqalar tomonidan o'rganilgan.

Hozirgi vaqtga kelib A va B to'plamning har biri chegarada yotganda, ya'ni $A \subset \partial D$ va $B \subset \partial G$ bo'lganda W to'plamning golomorflik qobig'ini topish masalasi dolzarb bo'lib, ushbu maqola ham shu masalani o'rganishga bag'ishlangan.

Ta'rif. Agar chegaralangan $D \subset C^n$ sohaning har bir chegaraviy $\xi \in \partial B$ nuqtasida Gyolder shartini qanoatlantiruvchi uzluksiz vektor funksiya bo'lgan tashqi birlik vektor ν_ξ mavjud bo'lsa, unda D soha **Lyapunov sohasi** deb ataladi.

Teorema. Aytaylik, $'D \subset C^{n-1}$ chegaralangan Lyapunov sohasi bo'lib, $f('z, z_n)$ funksiya $D \setminus S = ('D \times U_n) \setminus S$ sohada golomorf va $\overline{D} \setminus S$ da uzluksiz bo'lsin, bu yerda S to'plam D dagi yopiq va plyuripolyar to'plam. Agar $E \subset \partial' D$ to'plam uchun $mesE > 0$ bo'lib, ixtiyoriy fiksirlangan $'a \in E$ da $f('a, z_n)$ funksiya z_n o'zgaruvchining funksiyasi sifatida butun tekislikning polyar to'plamdan boshqa barcha nuqtalariga golomorf davom etsa, u holda $f('z, z_n)$ funksiya $('D \times C) \setminus \tilde{S}$ sohaga golomorf davom etadi.Bu yerda $\tilde{S}$ to'plam $'D \times C$ da yopiq plyuripolyar to'plam bo'lib, $\tilde{S} \cap D \in S$ bo'ladi.

Izoh. $S = \varnothing$ bo'lgan hol [2] da qaralgan.

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Construction of optimal difference formula in the Hilbert space

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Abstract: In this paper, we consider the problem of constructing new optimal difference formulas for finding an approximate solution of the initial problem for an ordinary differential equation in a Hilbert space $W_2^{(2,0)}(0,1)$. First, we study the construction of an optimal Adams-Bashforth-type explicit difference formula in the Hilbert space $W_2^{(2,0)}(0,1)$.

Here we minimize the norm of the error functional with respect to the coefficients and obtain a system of linear algebraic equations for the coefficients of the difference formulas.

Keywords: Hilbert space, initial problem, multi-step method, error functional, optimal difference formula.

We know that the solution of many practical problems leads to the solution of differential equations or their systems. Although differential equations have so many applications, only a small number of them can be solved with precision using elementary functions and their combinations. Even in the analytical analysis of differential equations, their application can be inconvenient due to the complexity of the obtained solution. If it is impossible to find an analytical solution to a differential equation, or if it is very difficult to obtain, we can try to find an approximate solution.

In this paper, we consider the problem of an approximate solution of a first-order linear ordinary differential equation

$$y' = f(x,y),\ x \in [0,1] \tag{1}$$

with initial condition

$$y(0) = y_0. \tag{2}$$

Suppose that $f(x,y)$ is an appropriate function and differential equation (1) with initial condition (2) has a unique solution on the segment $[0,1]$.

For an approximate solution of problem (1)-(2), we divide the segment $[0,1]$ into N pieces of length $h = \frac{1}{N}$ and find the approximate values y_n functions $y(x)$ for $n = 0,1,...,N$ at nodes $x_n = nh$.

The classical method for the approximate solution of the initial problem (1)-(2) is the Euler method. Using this method, the approximate solution of the differential equation is calculated as follows: to find the approximate value y_{n+1} of the function at the node x_{n+1} is used approximate value y_n at node x_n:

$$y_{n+1} = y_n + hy', \tag{3}$$

where $y'_n = f(x_n, y_n)$, so that y_{n+1} is a linear combination of the values $y(x)$ of the unknown function and its first order derivative at the node x_n.

Everyone knows that there are many methods for solving the initial problem for the ordinary differential equation (1). For example, the initial problem can be solved using the Euler, Runge-Kutta, Adams-Bashfort and Adams-Multon formulas of various degrees [1]. In [2] by Ahmad Fadli Nurullah Rasedi et al., they discussed the order and step size strategies of a variable step size algorithm. Estimates of the stability and convergence of the method are also established. In [3] M.Adekoya Odunayo and Z.O. Ogunwobi has shown that the Adam-Bashforth-Multon method is better than the Milne Simpson method at solving a second-order differential equation. Some studies have raised the question of whether the Nordsieck technique for changing the step size in the Adams-Bashforth method is equivalent to the explicit continuous Adams-Bashforth method. And in the work N.S. Hoang and R.B. Sige [4] they provided a complete proof that the two approaches are indeed equivalent. The papers [5] and [6] show the potential superiority of semi-explicit and semi-implicit methods over conventional linear multi-step algorithms.

However, it is very important to choose the correct one among these formulas for solving the initial problem, and this is not always possible. Also in this work, in contrast to the above-mentioned works, exact estimates of the error of the formula are obtained.

Our goal in this paper is to construct new difference formulas that are exact on trigonometry functions and optimal on the Hilbert space $W_2^{(2,0)}(0,1)$. Here, using the discrete analogue of the differential operator $\frac{d^4}{dx^4}+2\frac{d^2}{dx^2}+1$, the optimal difference formula is constructed. Also, these formulas can be used to solve certain classes of problems with great accuracy.

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Vaznli $\mathcal{P}$ o'lchov haqida bir teorema

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$\mathbb{C}^n$ kompleks fazoda $(n-1,n-1)$-bidarajali qat'iy musbat α differensial formani tayinlaymiz.

Ta'rif 1. $D\subset\mathbb{C}^n$ sohada berilgan $u(z)\in L^1_{loc}(D)$ funksiya uchun quyidagi shartlar

1) u yuqoridan yarim uzluksiz, ya'ni $\varlimsup_{z\to z^0} u(z)=\lim_{\varepsilon\to 0}\sup_{B(z^0,\varepsilon)} u(z)\le u(z^0)$;