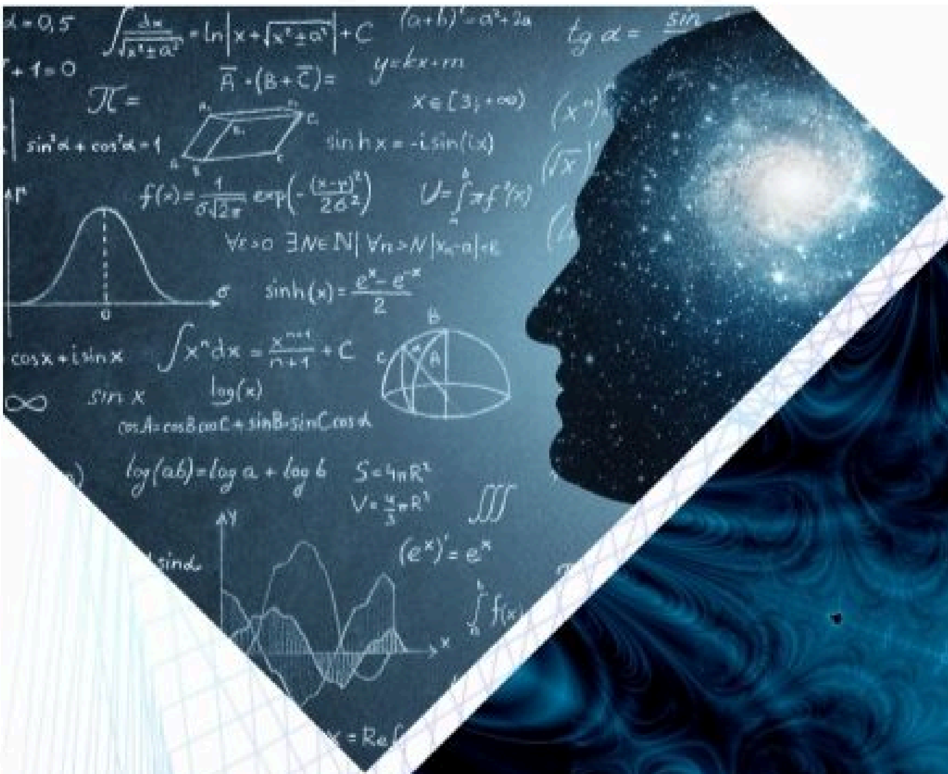

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ANALIZNING ZAMONAVIY MUAMMOLARI

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Theorem. *For the operator* W_1 *the following statements are true:*

i) *the set* $M_1 = \{\mathbf{x} \in S^2 : x_1 = x_2\}$ *is invariant set;*

ii) $\mathrm{Fix}(W_0) = \begin{cases} \{e_3\}, & \text{if } \alpha \le -1/2, \\ \{e_3, \mathbf{x}_\alpha^*\}, & \text{if } \alpha > -1/2, \end{cases}$ where $\mathbf{x}_\alpha^* = \left(\frac{1-x_\alpha^*}{2}, \frac{1-x_\alpha^*}{2}, x_\alpha^*\right)$;

iii) $W_0(\mathbf{x}^{(0)}) = \mathbf{e}_3$ *for any* $\mathbf{x}^{(0)} \in \{e_1, e_2, e_3\}$;

iv) if $\mathbf{x}^{(0)} \in S^2 \setminus \{e_1, e_2, e_3\}$ *then* $\omega_{W_0}(\mathbf{x}^{(0)}) = \begin{cases} \{e_3\}, & \text{if } \alpha \le -1/2, \\ \{\mathbf{x}_\alpha^*\}, & \text{if } \alpha > -1/2. \end{cases}$

REFERENCES

1. Ganikhodzhaev R.N.: Quadratic stochastic operators, Lyapunov functions and tournaments. Sb. Math. 76(2), 1993, pp. 489--506.
2. Jamilov U.U., Khudayberdiev Kh.O., Ladra M.: Quadratic operators corresponding to permutations. Stoch.Anal.Appl. 38(5), 929-938 (2020).
3. Jamilov U.U., On a family of strictly non-volterra quadratic stochastic operators. Jour. Phys. Conf. Ser., 697, 2016, 012013.

PUASSON INTEGRAL FORMULASINING ANALOGI

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Annotatsiya. *Ushbu maqolada* $G \subset D$ *soha lemniskata bo'lib, uning chegarasi* ∂G *da uzluksiz* $A(z)$ *– garmonik funksiyalar uchun Dirixle masalasining eng sodda yechimi sifatida Puasson formulasi analogi olingan.*

Ma'lumki klassik holdagi Puasson formulasi garmonik funksiyalar uchun Dirixli masalasining eng sodda yechimlaridan biri bo'ladi. Biz bu yerda $A(z)$– garmonik funksiyalar sinfi uchun Dirixli masalasini qaraymiz [1-5].

Aytaylik $G \subset D$ soha lemniskata bo'lib, uning chegarasi ∂G da uzluksiz funksiya berilgan bo'lsin.

Ana shu G lemniskatada $A(z)$– garmonik, $\overline{G}$ da uzluksiz bo'lgan shunday $u(z) \in h_A(G) \cap C(\overline{G}) : u|_{\partial G} = \varphi$ funksiya topilsinki, ∂G da $u(z)$ funksiya $\varphi(z)$ funksiya bilan ustma-ust tushsin $u(z)|_{\partial G} = \varphi(z)$.

Teorema. (A(z)-garmonik funksiya uchun Puasson formulasining analogi). *Agar* $\varphi(\xi)$ *funksiya* $L(a, R) \subset D$ *lemniskatada uzluksiz bo'lsa, u holda ushbu*

$$u(z) = \frac{1}{2\pi R} \oint_{|\psi(a,\xi)|=R} \varphi(\xi) \frac{R^2 - |\psi(a,z)|^2}{|\psi(a,z)|^2} \left| d\xi + A(\xi) d\overline{\xi} \right| \qquad (1)$$

funksiya $L(a, R)$ *da Dirixli masalasini yechimi bo'ladi.*

Isbot. Quyidagi yordamchi

$$f(\xi,z)=\frac{\psi(a,\xi)+\psi(a,z)}{\psi(z,\xi)}$$

funksiyani qaraymiz, Bu yerda $z\in L(a,R)$, $\xi\in\partial L(a,R)$. Ravshanki $f(\xi,z)$ funksiya $A(z)-$ analitik funksiya bo'ladi. Shuning uchun

$$\Pi(\xi,z)=\frac{1}{2\pi}\operatorname{Re} f(\xi,z)$$

funksiya $L(a,R)$ da $A(z)-$ garmonik bo'ladi. Shuningdek, $\operatorname{Re}f(\xi,z)$ ni f va $\overline{f}$ ifodasidan foydalanib

$$\Pi(\xi,z)=\frac{1}{2\pi}(f(\xi,z)+\overline{f(\xi,z)})=\frac{1}{2\pi}\left[\frac{\psi(a,\xi)+\psi(a,z)}{\psi(a,\xi)-\psi(a,z)}+\frac{\overline{\psi}(a,\xi)+\overline{\psi}(a,z)}{\overline{\psi}(a,\xi)-\overline{\psi}(a,z)}\right]= \tag{2}$$

$$\frac{1}{2\pi}\left[\frac{|\psi(a,\xi)|^2-|\psi(a,z)|^2}{|\psi(\xi,z)|^2}\right]=\frac{1}{2\pi}\left[\frac{R^2-|\psi(a,z)|^2}{|\psi(\xi,z)|^2}\right]$$

Bo'lishini topamiz. Demak, $u(z)$ funksiya $L(a,R)$ da $A(z)-$ garmonik ekan. $u(z)\in h_A\left[L(a,R)\right]$.

Endi $u(z)$ ni $\overline{L(a,R)}$ da uzluksiz va $u(z)|_{\partial L}=\varphi(\xi)$ bo'lishini ko'rsatamiz. Buning uchun quyidagi dalillardan foydalanamiz:

1) $$\frac{1}{2\pi R}\int_{|\psi(a,\xi)|=R}\frac{R^2-|\psi(a,z)|^2}{|\psi(\xi,z)|^2}\left|d\xi+A(\xi)\,d\overline{\xi}\right|=1$$

2) $z_0\in\partial L(a,R)$, $\xi=\xi_0$ uchun $z\to\xi_0$ da har qanday $\gamma_\delta=\partial L(a,R)\setminus U(\xi,\delta)$ yoyda $\Pi(\xi,z)$ funksiya 0 ga tekis yaqinlashadi. $\Pi(\xi,z)\to 0$, agar $z\to\xi_0,\xi=\xi_0$.

Deylik $\psi(a,\xi)=\mathrm{Re}^{it}$ bo'lsin. U holda

$$\left|dz+Ad\overline{z}\right|=\left|\frac{\partial\psi}{\partial z}dz+\frac{\partial\psi}{\partial\overline{z}}\right|=\left|d\psi(\xi,a)\right|=\left|dR\,e^{it}\right|=\left|\mathrm{Rie}^{it}\,dt\right|=Rdt$$

va

$$\frac{1}{2\pi R}\int_{|\psi(a,\xi)|=R}\varphi(\xi)\frac{R^2-|\psi(a,z)|^2}{|\psi(\xi,z)|^2}\left|d\xi+A(\xi)\,d\overline{\xi}\right|=\frac{1}{2\pi}\int_0^{2\pi}\varphi(\xi)\frac{R^2-|\psi(a,z)|^2}{|\psi(\xi,z)|^2}d$$

bo'ladi.

FOYDALANILGAN ADABIYOTLAR RO'YXATI

1. Arbuzov E.V, Bukhgeim A.L. "Carleman's formulas for A-analytic functions in a half-plane", J.Inv.III-Posed Problems, 1997.
2. Абдуллаев Б.И. "Задача Дирихле в классе m wsh – функций" Узбекский математический журнал, 2012, №4, с.3-10.
3. Абдуллаев Б.И. "Задача Дирихле для m sh – функций регулярных областях" Доклады АНРУз., 2012, №6, с.9-11.

4. Bremermann H.J. "On a generalized Dirichlet problem for plurisubharmonic functions and pseudoconvex domains. Characterization of Silov boundaries" Trans.Amer. Math.Soc, 1959, 91, p. 246-276.
5. Hayman W.K. and Kennedy P.B. " Subharmonic functions", Academik Press, 1976y.

ANALITIK GRAFIK USTIDA ANIQLANGAN GOLOMORF FUNKSIYALAR UCHUN VEIL INTEGRAL FORMULASI

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Annotatsiya: *Ushbu tadqiqot ishida kompleks fazodagi analitik funksiyaning grafigi ustida aniqlangan golomorf funksiyalar uchun maxsus poliedrda Veil integral formulasi o'rganiladi.*

Butun funksiya grafigidan iborat kompleks ko'pxillik ustida golomorf funksiyalarning integral formula orqali chegaraviy qiymatlar orqali tiklanishi masalasini qaraylik. Shteyn ko'pxilliklarida global integral formulalar G.Henkin va J.Leiterer[1] monografiyasida batafsil yoritiladi. Shuningek, analitik to'plamlar ustida bu kabi formulalar T.E.Hatziafratis[2] tomonidan ham o'rganilgan va bir muncha sodda ko'rinishga keltiriladi. Biz ushbu ishda yanada sodda holda ya'ni grafik ustida formula ko'rinishini o'rganib chiqamiz.

$$\mathbb{C}^{n+1} = \mathbb{C}^n_z \times \mathbb{C}_w \text{ fazoda } \Gamma = \left\{(z_1,...,z_n,w) \in \mathbb{C}^{n+1} : z \in \mathbb{C}^n_z,\ w = \varphi(z)\right\}$$

analitik grafikni qaraymiz. Bu yerda $\varphi(z) = \varphi(z_1, z_2, ..., z_n)$ funksiya $\mathbb{C}^n_z$ kompleks fazoda aniqlangan butun funksiyadan iborat. Biz $\mathbb{C}^{n+1} = \mathbb{C}^n_z \times \mathbb{C}_w$ fazoda aniqlangan $g_1(z,w), g_2(z,w), ..., g_N(z,w)$ (N>n) golomorf funksiyalar olib, ushbu

$$\Pi = (z,w) \in \Gamma : \left|g_1(z,w)\right| < 1, ..., \left|g_N(z,w)\right| < 1$$

poliedrni aniqlaymiz. Har bir tayinlangan $J = (j_1, j_2, ..., j_n),\ 1 \le j_1 < j_2 < ... < j_n \le N$ indekslar nabori uchun

$$e_J = (\xi,\eta) \in \Pi : \left|g_{j_1}(\xi,\eta)\right| = \left|g_{j_2}(\xi,\eta)\right| = ... = \left|g_{j_n}(\xi,\eta)\right| = 0$$

to'plamlarga poliderning ostovlari deyiladi. $\partial\Pi = \bigcup_J e_J$ topologik chegara deyiladi.

Agar poliedrning ostovlari n o'lchami bo'lakli silliq ko'pxilliklardan iborat bo'lsa unga grafik ustidagi Veil poliedri deymiz. Bizga quyida tushunchalar kerak bo'ladi Ushbu yoyilmalar

$$\varphi(z) - \varphi(\xi) = \sum_{k=1}^{n} \varphi_k(\xi,z)(\xi_k - z_k)$$