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ABSTRACT

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DISKRET PARAMETRLI IKKINCHI TARTIBLI OPERATORLI MATRITSANI CHIZIQLILIKKA TEKSHIRISH

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Annotatsiya: Panjaradagi soni saqlanmaydigan zarrachalar sistemasiga mos keluvchi blok operatorli matritsalarning spektral xossalarini o‘rganish bilan bog‘liq masalalar statistik fizika, qattiq jismlar fizikasi, mexanika va gidrodinamikaning ko‘plab sohalarida uchrab turadi. Shu nuqtai nazardan ushbu mavzu dolzarb hisoblanadi.

Kalit so‘zlar: Gilbert fazosi, Fok fazosi, skalyar ko‘paytma, kompleks fazo, qo‘shma operatorlar, o‘z – o‘ziga qo‘shma operator.

Annotation. Issues related to the study of the spectral properties of block-operator matrices corresponding to a system of particles whose number is not conserved in the lattice are found in many areas of statistical physics, solid-state physics, mechanics, and hydrodynamics. From this point of view, this topic is relevant.

Keywords: Gilbert space, Fok space, scalar product, complex space, additive operators, self – adjoint operator.

$H_0 := \mathbb{C}$ - bir o‘lchamli kompleks fazo, $H_1 := L_2(\mathbb{T}^d)$ - $\mathbb{T}^d$ da aniqlangan kvadrati bilan integrallanuvchi, (umuman olganda, kompleks qiymatli) funksiyalar Gilbert fazosi bo‘lsin. $H^{(2)}$ orqali H_0 va H_1 fazolarning to‘g‘ri yig‘indisini belgilaymiz, ya‘ni $H^{(2)} := H_0 \oplus H_1$ [1].

Odatda, $H^{(2)}$ Gilbert fazosiga Fok fazosining qirqilgan ikki zarrachali qism fazosi deyiladi. $H^{(2)}$ Gilbert fazosining ixtiyoriy f elementi $f = (f_0, f_1)$ kabi tasvirlanadi, bunda $f_0 \in H_0, f_1 \in H_1$ [1].

$f = (f_0, f_1) \in H^{(2)}$ elementning normasi

$$\|f\| = \sqrt{\|f_0\|_0^2 + \|f_1\|_1^2}$$

formula yordamida topiladi:

$$\|f_0\|_0 = |f_0|, \|f_1\|_1 = \sqrt{\int_{\mathbb{T}^d} \int_{\mathbb{T}^d} |f_1(t)|^2 dt}.$$

Ikkita $f = (f_0, f_1), g = (g_0, g_1) \in H^{(2)}$ elementlarning skalyar ko‘paytmasi

$$(f, g) = (f_0, g_0)_0 + (f_1, g_1)_1$$

kabi topiladi:

$(f_0, g_0)_0 = f_0 \cdot \overline{g_0}$, $(f_1, g_1)_1 = \int_{\mathbb{T}^d} f_1(t)\overline{g_1(t)}dt$.

$H^{(2)}$ Gilbert fazosida quyidagi ikkinchi tartibli

$$A_2^{(s)} := \begin{pmatrix} \hat{A}_{00}^{(s)} & \hat{A}_{01} \\ \hat{A}_{01}^{*} & \hat{A}_{11}^{(s)} \end{pmatrix} \qquad (1)$$

operatorli matritsani qaraymiz, bu yerda

$$A_{ii}: H_i \to H_i, \qquad i = 0,1, A_{01}: H_1 \to H_0$$

operatorlar quyidagicha aniqlangan:

$\hat{A}_{00}^{(s)} f_0 = s\varepsilon f_0, f_0 \in H_0$;

$$\hat{A}_{01} f_1 = \alpha \int_{\mathbb{T}^d} v(t) f_1(t) dt\,, f_1 \in H_1;$$

$$\left(\hat{A}_{11}^{(s)} f_1\right)(x) = (-s\varepsilon + u(x)) f_1(x),\ f_1 \in H_1.$$

Bunda, $s = \pm, \varepsilon$ – haqiqiy son, $v(\cdot)$ va $u(\cdot)$ lar haqiqiy qiymatli uzluksiz funksiyalar, $\alpha > 0$ – esa "ta'sirlashuv parametri", $\hat{A}_{01}^{*}$ operator mos ravishda $\hat{A}_{01}$ operatorga qo'shma operatorlar bo'lib, ular quyidagicha aniqlanadi:

$$\left(\hat{A}_{01} f_1, f_0\right) = \left(f_1, f_0 \hat{A}_{01}^{*}\right)$$

$$\left(\hat{A}_{01} f_1, f_0\right) = \left(\alpha \int_{\mathbb{T}^d} v(t) f_1(t) dt, f_0\right) = \alpha \int_{\mathbb{T}^d} v(t) f_1(t) dt, \overline{f_0} =$$

$$= \int_{\mathbb{T}^d} \overline{\alpha v(t) f_0}\, f_1(t) dt = \int_{\mathbb{T}^d} f_1(t) \overline{\alpha v(t) f_0} dt$$

$$\hat{A}_{01}^{*} = \alpha\, v(t) f_0$$

$$(\hat{A}_{01}^{*} f_0)(x) = \alpha\, v(x) f_0, f_0 \in H_0.$$

1 – lemma. $H^{(2)}$ Gilbert fazosida (1) formula orqali ta'sir qiluvchi ikkinchi tartibli $A_2^{(s)}$ operatorli matritsa chiziqli, chegaralangan va o'z – o'ziga qo'shma operator bo'ladi [2].

Isbot. Ixtiyoriy $a, b \in \mathbb{C}$ kompleks sonlar va ixtiyoriy $f = (f_0, f_1), g = (g_0, g_1) \in H^{(2)}$ elementlar uchun

$$A_2^{(s)}(af + bg) = aA_2^{(s)} f + bA_2^{(s)} g$$

tenglikni tekshirish orqali $A_2^{(s)}$ operatorli matritsaning chiziqli operator ekanini isbotlaymiz.

Dastlab,

$$A_2^{(s)} f := \begin{pmatrix} \hat{A}_{00}^{(s)} & \hat{A}_{01} \\ \hat{A}_{01}^{*} & \hat{A}_{11}^{(s)} \end{pmatrix} \begin{pmatrix} f_0 \\ f_1 \end{pmatrix} = \begin{pmatrix} \hat{A}_{00}^{(s)} f_0 + \hat{A}_{01} f_1 \\ \hat{A}_{01}^{*} f_0 + \hat{A}_{11}^{(s)} f_1 \end{pmatrix} =$$

$$= \begin{pmatrix} s\varepsilon f_0 + \alpha \int\limits_{\mathbb{T}^d} v(t) f_1(t) dt \\ \alpha v(x) f_0 + \big(-s\varepsilon + u(x)\big) f_1(x) \end{pmatrix}$$

ekanligini ta'kidlab o'tamiz.

$$A_2^{(s)}(af + bg) =$$

$$\begin{pmatrix} s\varepsilon(af_0 + bg_0) + \alpha \int\limits_{\mathbb{T}^d} v(t)(af_1(t) + bg_1(t)) dt \\ \alpha v(x)(af_0 + bg_0) + \big(-s\varepsilon + u(x)\big)(af_1(x) + bg_1(x)) \end{pmatrix} =$$

$$= \begin{pmatrix} s\varepsilon af_0 + \alpha \int\limits_{\mathbb{T}^d} v(t) af_1(t) dt + s\varepsilon bf_0 + \alpha v(t) bf_1(t) dt \\ \alpha v(x) af_0 + \big(-s\varepsilon + u(x)\big) af_1(x) + \alpha v(x) bf_0 + \big(-s\varepsilon + u(x)\big) bf_1(x) \end{pmatrix} =$$

$$= a \begin{pmatrix} s\varepsilon f_0 + \alpha \int\limits_{\mathbb{T}^d} v(t) f_1(t) dt \\ \alpha v(x) f_0 + \big(-s\varepsilon + u(x)\big) f_1(x) \end{pmatrix} +$$

$$+ b \begin{pmatrix} s\varepsilon g_0 + \alpha \int\limits_{\mathbb{T}^d} v(t) g_1(t) dt \\ \alpha v(x) g_0 + \big(-s\varepsilon + u(x)\big) g_1(x) \end{pmatrix} =$$

$$= aA_2^{(s)} f + bA_2^{(s)} g.$$

Demak, berilgan diskret parametrli ikkinchi tartibli operatorli matritsa $A_2^{(s)}$ chiziqli operator ekan.

Foydalanilgan adabiyotlar:

1. Б. И. Бахронов. У., Б. Б. Холмуродов. У. Изучение спектра одной 3x3-операторной матрицы с дискретным параметром //Наука, техника и образование. – 2021. – №. 2-2 (77). – С. 31-34.
2. Бахронов Б. И. У., Мансуров Т. З. У. Вычисление существенного спектра обобщенной модели Фридрихса в системе MAPLE //Наука, техника и образование. – 2021. – №. 2-2 (77). – С. 35-38.
3. Мансуров Т. З. У. Классификация видов самостоятельных работ учащихся на уроках математики по дидактическому признаку //Science and Education. – 2022. – Т. 3. – №. 6. – С. 1078-1084.
4. Мансуров Т. З. У. Психолого-дидактические условия развития речемыслительной деятельности учащихся в процессе обучения математике //Science and Education. – 2022. – Т. 3. – №. 6. – С. 1109-1115.

5. Мансуров Т. З. У. Самостоятельная работа на уроках математики это средство творческого развития учащихся //Science and Education. – 2022. – Т. 3. – №. 6. – С. 1116-1121.

6. Мансуров, Т. З. у. (2022). Целесообразные уровни самостоятельности. Science and Education, 3(6), 1129–1135.

7. Ражабова Г. С. Об одном применении критерия Вейля //Молодой ученый. – 2017. – №. 25. – С. 12-13.

8. Раджабова Г. С. СОБСТВЕННЫЕ ФУНКЦИИ ИНТЕГРАЛЬНОГО ОПЕРАТОРА РАНГА 2 //УЧЕНЫЙ XXI ВЕКА. – С. 10.

9. Раджабова Г. С. ОЦЕНКИ ДЛЯ ОПРЕДЕЛИТЕЛЬЯ ФРЕДГОЛЬМА СООТВЕТСТВУЮЩЕЙ СЕМЕЙСТВА МОДЕЛЕЙ ФРИДРИХСА //УЧЕНЫЙ XXI ВЕКА. – С. 12.

10. Ражабова Г. С. АЛЬ–ХОРЕЗМИ-ВЕЛИКИЙ МАТЕМАТИК И ОСНОВАТЕЛЬ АЛГОРИТМА: Ражабова Гулчехра Саломовна, преподаватель кафедры «Точные науки» Педагогического института при Бухарском государственном университете //Образование и инновационные исследования международный научно-методический журнал. – 2022. – №. 2. – С. 74-80.

11. Ismatovna, Asadova Yulduz. "THE METHODS OF TEACHING, LEARNING TO INDEPENDENT WORK: MOODLE EXPERIENCE AT BUKHARA STATE PEDAGOGICAL INSTITUTE IN UZBEKISTAN, BUKHARA STATE PEDAGOGICAL INSTITUTE." *Web of Scientist: International Scientific Research Journal* 3.11 (2022): 1285-1291.

12. Ismatovna A. Y. METHODOLOGY OF ORGANIZING INDEPENDENT EDUCATION OF STUDENTS BASED ON ELECTRONIC PLATFORMS //Proceedings of International Conference on Educational Discoveries and Humanities. – 2023. – Т. 2. – №. 3. – С. 119-125.

13. Ismatovna A. Y. Technology of organizing independent education of students in teaching" information technologies in education" on the base of distance learning platforms //Studies in Economics and Education in the Modern World. – 2022. – Т. 1. – №. 8.

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NOTE!
The authors are personally responsible for the truthfulness of the information and evidence included in the international scientific journal "SCIENCE SHINE" and the correctness and accuracy of the quotations!

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