ta'sirida hosil bo'ladigan kuchlanishlarga geometrik va fizik-mexanik parametrlar o'zgarishiga bog'liq solishtirma baholandi.

Foydalanilgan adabiyotlar ro'yxati:

(1). Горшков А.Г. Нестационарное взаимодействие пластин и оболочек со сплошными средами. Изв. РАН, МТТ, 1981, № 4, с. 177 – 189.

(2). Авлиякулов Н.Н., Сафаров И.И. Современные задачи статики и динамики подземных трубопроводов. Ташкент, 2007, 306 с.

(3). Бозоров М.Б., Сафаров И.И., Шокин Ю.И. Численное моделирование колебаний диссипативно однородных и неоднородных механических систем. СО РАН, Новосибирск, 1966, 188 с.

(4). Safarov I.I. Колебания и волны в диссипативно-неоднородных средах и конструкциях. Tashkent, "Fan", 1992, 250 с.

(5). Safarov I.I., Kayumov S.S. Распространение и дифракция волн в диссипативно-неоднородных цилиндрических деформируемых механических системах. Tashkent, "Fan", 2002, 214 с

Yuldashev Inomjon G'ulomboy o'g'li (Nukus davlat Pedagogika instituti "Matematika o'qitish metodikasi" kafedrasi assistent o'qituvchisi; i.yuldashev1990@mail.ru)

TO'LDIRUVCHI FAZONING O'LCHAMI MAXSIMAL NILRADIKALI FILIFORM BO'LGAN YECHILUVCHAN LI ALGEBRASINING LOKAL DIFFERENSIALLASHLARI

Annotatsiya. *Xarakteristikasi nolga teng algebraik yopiq maydon ustida chekli o'lchamli Li algebralarida lokal va 2-lokal differensiallashlar va avtomorfizmga oid yurtimizda bir qator ilmiy izlanishlar olib borilib, dastlabki natijalar Sh.A.Ayupov, K.K.Kudaybergenov, I.S.Raximovlarga tegishlidir [1]. Ular tomonidan yarim sodda Li algebrasidagi har bir 2-lokal differensiallash oddiy ma'noda differensiallash ekanligi va o'lchami ikkidan katta ixtiyoriy nilpotent Li algebrasida differensiallash bo'lmagan 2-lokal differensiallash mavjudligini isbotlangan. Keyinchalik, Sh.A.Ayupov va K.K.Kudaybergenovlar yarim sodda Li algebralaridagi har bir lokal differensiallash ham oddiy ma'noda differensiallash ekanligini isbotladilar va differensiallash bo'lmagan lokal differensiallashi mavjud bo'lgan chekli o'lchamli nilpotent Li algebralariga misollar keltirdilar [5]. Sodda Li algebralar uchun 2-lokal avtomorfizmlar Z.Chen va D.Vanglar tomonidan o'rganila boshlanib, ular tomonidan* A_l, D_l *yoki* $E_k, (k = 6,7,8)$ *algebralar uchun har qanday 2-lokal avtomorfizm avtomorfizm ekanligi isbotlangan [6]. Keyinchalik, Sh.A.Ayupov va K.K.Kudaybergenovlar tomonidan ushbu natija umumlashtirilib, xa-rakteristikasi nol bo'lgan algebraik yopiq maydon ustuda berilgan ixtiyoriy chekli o'lchamli yarim sod-da Li algebrasining har qanday 2-lokal avtomorfizmi avtomorfizm ekanligini isbotlandi[11]. Bundan tashqari, ixtiyoriy chekli o'lchamli nilpotent Li algebrasida avtomorfizm bo'lmagan 2-lokal avtomorfizm mavjudligini ko'rsatildi. Sh.A.Ayupov va K.K.Kudaybergenovlar ba'zi chekli o'lchamli sodda Li va Leibniz algebralarining lokal avtomorfizmlarini o'rganganlar[14].*

Kalit so'zlar: *Li algebra, differentsiallash, lokal differentsiallash, lokal avtomorfizm, 2-lokal differensiallashlar, chiziqli operator.*

Юлдашев Иномжон Гуломбой ўғли (Нукусский государственный педагогический институт, кафедра методики преподавания математики , ассистент)

ЛОКАЛЬНЫЕ ДИФФЕРЕНЦИРОВАНИЯ РАЗРЕШИМОЙ АЛГЕБРЫ ЛИ С МАКСИМАЛЬНОЙ НУЛЬ-РАДИКАЛЬНОЙ ФИЛИФОРМНОЙ РАЗМЕРНОСТЬЮ ДОПОЛНИТЕЛЬНОГО ПРОСТРАНСТВА

Аннотация. *На нашей странице проведен ряд научных исследований по локальной и 2-локальной дифференциации и автоморфизмам и конечномерным алгебрам Ли и алгебраическим замкнутым полям с нулевыми характеристиками, основные результаты приведены Ш.А. Аюповым, К.К. Кудайбергеновым и И.С. Рахимовым [1]. Доказано, что всякая 2-локальная дифференциация в полупростой алгебре Ли дифференцируема в обычном смысле и что существует 2-локальная дифференциация, которая не дифференцируема в произвольной нильпотентной алгебра размерности больше двух. Позже Ш.А. Аюпов и К.К. Кудайбергенов доказали, что всякая локальная дифференциация в полупростых алгебрах Ли также дифференцируется в обычном смысле, и привел первичных конечных нильпотентных алгебрах Ли, и которые основаны на локальной дифференциации, а не на дифференцировании [5]. Исследование 2-локальных автоморфизмов для простой алгебры Ли началось с работы Жени Чены и Д.Ваны, в которой доказано, что для любого 2-локального автоморфизма алгебра имеет автоморфизм [6]. Позже общим методом Ш.А. Аюпова*

и К.К. Кудайбергенова доказано, что любой 2-локальный автоморфизм произвольной конечномерной полупростой алгебры Ли и алгебраического замкнутого поля с нулевыми характеристиками является автоморфизмом [11]. Кроме того, показано, что существует 2-й локальный автоморфизм, который не является автоморфизмом в произвольной конечномерной нильпотентной алгебре Ли. Ш.А. Аюпов и К.К. Кудайбергенов абстрактные локальные автоморфизмы некоторых конечномерных простых алгебр Ли и Лейбница [14].

Ключевые слова: *алгебра Ли, дифференцирование, локальное дифференцирование, 2-локальное дифферен-цирование, линейный оператор.*

Yuldashev Inomjon G'ulomboy o'g'li (Assistant teacher, Department of Mathematics Teaching Methods, Nukus State Pedagogical Institute

LOCAL DIFFERENTIATIONS OF A SOLVABLE LIE ALGEBRA WITH MAXIMAL NILRADICAL FILIFORM DIMENSION OF THE COMPLEMENT SPACE

Annotation. *In our page, a number of scientific studies on local and 2-local differentiation and automorphisms and finite-dimensional algebras of Li and algebraic closed fields are carried out with zero characteristics, primary results are given by Sh.A.Ayupov, K.K.Kudaybergenov and I.S. Rakhimov[1]. It is proved that every 2-local differentiation in a semisimple Lie algebra is differentiable in the ordinary sense and that 2-local differentiation exists, which is not differentiable in an arbitrary nilpotent algebra of dimensions greater than two. Pozje Sh.A.Ayupov and K.K.Kudaybergenov proved that all local differentiation in semiprostyx algebras Li is also differentiated by ordinary smysle, and privel primary finite nilpotent algebras Li, and which are based on local differentiation, not by differentiation [5]. Study 2-local automorphisms for simple algebra Li nachalos s rabot Zhenya Chena and D.Vana, which is proved, for any 2-local automorphism, algebra has an automorphism [6]. Pozje Sh.A.Ayupov and K.K. Kudaybergenov's general method proved that any 2-local automorphism of an arbitrary finite-dimensional semisimple algebra Li and an algebraic closed field with zero characteristics is an automorphism [11]. In addition, it was shown that the 2nd local automorphism exists, which is not an automorphism in an arbitrary finite-dimensional nilpotent Lie algebra. Sh.A.Ayupov and K.K.Kudaybergenov abstract local automorphisms of some finite-dimensional simple algebras of Lie and Leibniz [14].*

Key words: *Lie algebra, derivation, local derivation, local automorphism, 2-local different-iations, linear operator.*

Kirish. $\mathcal{A}$ ba'zi bir algebra (associativ bo'lmagan). $D:\mathcal{A}\to\mathcal{A}$ chiziqli akslantirish barcha $x,y\in\mathcal{A}$ elementlar uchun $D(xy)=D(x)y+xD(y)$ tengligini qanoatlantirsa, unda bu akslantirish differentsiyallash deyiladi. A chiziqli akslantirish Δ lokal differensiyallash deyiladi, agar har bir $x\in\mathcal{A}$ uchun D_x differensiyallash bor bo'lib, bunda $\mathcal{A}$ (x elementiga bog'liq) differensiyallash ko'rinishi quyidagicha $\Delta(x)=D_x(x)$. Lokal avtomorfizmning ta'rifi ham xuddi shunday beriladi [2].

Adabiyotlar tahlili. Yuqoridagi tushunchalar R.V.Kadison ishlarida keltirilgan va o'rganilgan [2]. Shu bilan birgalikda, D.R.Larson va A.R.Sourour ishlarida ham keltirilgan [3]. Yuqorida ta'kidlab o'tilgn ishlar avtomorfizmlar, C^*-algebralar va operator algebralarning differensiyallashlariga yaqin bo'lgan akslantirishlarning tavsifiga bag'ishlangan bir qator ishlarga turtki bo'ldi. D.R.Larson va A.R.Sourourlar $\mathcal{A}=B(X)$, tenglikni isbotlashdi, X Banax fazosidagi barcha chegralangan chiziqli opertorlar algebrasi, u holda $\mathcal{A}$ ning har bir teskari lokal avtomorfizmi avtomorfizmdir. Shunday qilib, $B(X)$ dagi avtomorfizmlar ularning lokal ta'siri yordamida to'liq aniqlanadi. Noassotsiativ algebralarda lokal va 2-lokal differensiallashlar va avtomorfizmlarni o'rganish bo'yicha jahon miqyosida ham bir qator izlanishlar olib borilmoqda. Jumladan, T.Beker, J.Eskobar, C.Salas va R.Turdibaevlar uch o'lchamli sodda Li algebrasining lokal avtomorfizmlari to'plami avtomorfizmlar va antiavtomorfizmlar gruppasi bilan usma-ust tushishini ko'rsatishgan bo'lsa, keyinchalik, [15], M.Kostantini ixtiyoriy sodda Li algebrasidagi chiziqli akslantirish lokal avtomorfizm bo'lishi uchun uning avtomorfizm yoki anti-avtomorfizm bo'lishi zarur va yetarli ekanligini isbotladi. Li superalgebralaridagi lokal va 2-lokal avtomorfizmlar va differensiallashlarga doir natijalarni X.Chen, Y.Vang va J.Nanlarning ishlarida ko'rish mumkin. Sh.A.Ayupov, K.K.Kudaybergenov va B.A.Omirovlar sodda Leibniz algebralarida lokal va 2-lokal differensiallash va avtomorfizmlarni o'rganib, Li algebralaridagi kabi natijalarni isbotladilar [4]. Murakkab yarim oddiy chekli o'lchovli Leybnits algebrasidagi har bir lokal differensiyallash differensiyallash ekanligini isbotlangan [8].

Tadqiqot metodologiyasi. Yechiluvchan Li algebralari. $\mathcal{L}$ Li algebrasi bo‘lsin. Quyidagi markaziy qatorlarni qaraylik:

$$\mathcal{L}^1 = \mathcal{L}, \quad \mathcal{L}^{k+1} = [\mathcal{L}^k, \mathcal{L}], \quad k \geq 1,$$

$$\mathcal{L}^{[1]} = \mathcal{L}, \quad L^{[s+1]} = [L^{[s]}, \mathcal{L}^{[s]}], \quad s \geq 1.$$

$\mathcal{L}$ Li algebrasi nilpotent deyiladi (mos ravishda, yechiluvchan), agar shunday $p \in \mathbb{N}$ ko‘rinishdagi $\mathcal{L}^p = 0$ (mos ravishda, $\mathcal{L}^{[p]} = 0$). Bunda k eng kichik butun son $\mathcal{L}^k = 0$ tengligi $\mathcal{L}$ ning nilindeksi (yoki nilpotentlik kllasi) deyiladi. [6]

Ushbu maqolada biz nilradikal filiform Li algebralari bo‘lgan maksimal yechiladigan Li algebralari bo‘yicha lokal differensialini o‘rganamiz.

Olingan natijalar va muhokama. Teorema. $s_{n,2}$ va $\tau_{2n,2}$ yechiladigan Li algebralari bo‘lsin, u holda $s_{n,2}$ va $\tau_{2n,2}$ ning har qanday lokal differensiali differensialdir.

Isbot. Biz $s_{n,2}$ algebra uchun isbotni kiritamiz, $\tau_{2n,2}$ algebra uchun isbot o‘xshash. $s_{n,2}$ ning lokal differensiali Δ bo‘lsin.

$$\Delta(e_i) = \sum_{j=1}^{n} \beta_{j,i} e_j + \beta_{n+1,i} x + \beta_{n+2,i} y, \qquad 1 \leq i \leq n,$$

$$\Delta(x) = \sum_{j=1}^{n} \beta_{j,n+1} e_j + \beta_{n+1,n+1} x + \beta_{n+2,n+1} y,$$

$$\Delta(y) = \sum_{j=1}^{n} \beta_{j,n+2} e_j + \beta_{n+1,n+2} x + \beta_{n+2,n+2} y$$

Lokal differensialning ta’rifini yozamiz $\Delta(\xi) = d_\xi(\xi)$. Ta’rif bo‘yicha quyidagilarni ko‘rib chiqamiz:

$$d_{e_1}(e_1) = a_1^{e_1} e_1 + \sum_{i=3}^{n} a_i^{e_1} e_i,$$

$$d_{e_2}(e_2) = b_2^{e_2} e_2 - c_1^{e_2} e_3,$$

$$d_{e_3}(e_3) = \left(b_2^{e_3} + a_1^{e_3}\right) e_3 - c_1^{e_3} e_4,$$

$$\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots$$

$$d_{e_i}(e_i) = \left(b_2^{e_i} + (i-2) a_1^{e_i}\right) e_i - c_1^{e_i} e_{i+1},$$

$$d(x) = c_1^x e_1 + \sum_{i=3}^{n-1} (i-2) a_{i+1}^x e_i + c_n^x e_n,$$

$$d(y) = \sum_{i=2}^{n-1} a_{i+1}^y e_i + \frac{c_n^y}{(n-2)} e_n.$$

$\Delta(x) = d_x(x)$ dan, $\beta_{2,n+1} = \beta_{n+1,n+1} = \beta_{n+2,n+1} = 0$ ni olamiz. $\Delta(y) = d_y(y)$ dan, $\beta_{1,n+2} = \beta_{n+1,n+2} = \beta_{n+2,n+2} = 0$ ni olamiz . $\Delta(e_1) = d_{e_1}(e_1)$ dan, $\beta_{2,1} = \beta_{n+1,1} = \beta_{n+2,1} = 0$ ga ega bo‘lamiz. $\Delta(e_i) = d_{e_i}(e_i)$ dan, $\beta_{n+1,i} = \beta_{n+2,i} = \beta_{j,i} = 0$, $j \neq i$ va $j \neq i+1$, $2 \leq i \leq n$ ga ega bo‘lamiz. Lokal differensialning matritsa shakli.

$$\Delta(e_1) = \beta_{1,1} e_1 + \sum_{j=3}^{n} \beta_{j,1} e_j,$$

$$\Delta(e_i) = \beta_{i,i} e_i + \beta_{i,i+1} e_{i+1}, \qquad 2 \leq i \leq n,$$

$$\Delta(x) = \beta_{1,n+1} e_1 + \sum_{j=3}^{n} \beta_{j,n+1} e_j,$$

$$\Delta(y) = \sum_{j=2}^{n} \beta_{j,n+2} e_j.$$

Endi biz quyidagi identifikatorni ko‘rib chiqamiz:

$$\Delta\left(x-(i-2)y\right)=D_{x-(i-2)y}\left(x-(i-2)y\right).$$

$$b_{n+1,1}e_1-(i-2)b_{n+2,2}e_2+\left(b_{n+1,3}-(i-2)b_{n+2,3}\right)e_3+\ldots+\left(b_{n+1,i-1}-(i-2)b_{n+2,i-1}\right)e_{i-1}+$$
$$+\left(b_{n+1,i}-(i-2)b_{n+2,i}\right)e_i+\ldots+\left(b_{n+1,n}-(i-2)\ b_{n+2,n}\right)e_n\ =$$
$$=-b_{3,x-(i-2)y}e_1-(i-2)a_{3,x-(i-2)y}e_2+\left(a_{4,x-(i-2)y}-(i-2)a_{4,x-(i-2)y}\right)e_3+\ldots+$$
$$+\left((i-3)a_{i,x-(i-2)y}-(i-2)a_{i,x-(i-2)y}\right)e_{i-1}+\left((i-2)a_{i+1,x-(i-2)y}-(i-2)a_{i+1,x-(i-2)y}\right)e_i+\ldots+$$
$$+\left(c_{n,x-(i-2)y}-\frac{(i-2)}{n-2}c_{n,x-(i-2)y}\right)e_n$$

Bundan $b_{n+1,i}=(i-2)b_{n+2,\mathrm{i}}$, $i=\overline{3,n}$ ga ega bo‘lamiz.

Quyidagi tenglikni qaraymiz, $j=\overline{2,n}$

$$\Delta\left(e_1+x-(j-1)y\right)=\left(b_{1,1}+b_{n+1,1}\right)e_1-(j-1)b_{n+2,2}e_2+\left(b_{1,3}+b_{n+2,3}-(j-1)b_{n+2,3}\right)e_3+$$
$$+\ldots+\left(b_{1,\mathrm{i}-1}+(i-3)b_{n+2,i-1}-(j-1)b_{n+2,i-1}\right)e_{i-1}+\left(b_{1,i}+(i-2)b_{n+2,i}-(j-1)b_{n+2,i}\right)e_i+$$
$$+\ldots+\left(b_{1,\mathrm{n}}+(n-2)b_{n+2,\mathrm{n}}-(j-1)b_{n+2,\mathrm{n}}\right)\ e_n.$$

boshqa tomondan,

$$\Delta\left(e_1+x-(j-1)y\right)=D_{e_1+x-(j-1)y}\left(e_1+x-(j-1)y\right)=\left(a_{1,e_1+x-(j-1)y}-b_{3,e_1+x-(j-1)y}\right)e_1-$$
$$-(j-1)a_{3,e_1+x-(j-1)y}e_2+\left(a_{3,e_1+x-(j-1)y}+a_{4,e_1+x-(j-1)y}-(j-1)a_{4,e_1+x-(j-1)y}\right)e_3+\ldots+$$
$$+\left(a_{i-1,e_1+x-(j-1)y}+(i-3)a_{i,e_1+x-(j-1)y}-(j-1)a_{i,e_1+x-(j-1)y}\right)e_{i-1}+$$
$$+\left(a_{i,e_1+x-(j-1)y}+(i-2)a_{i+1,e_1+x-(j-1)y}-(j-1)a_{i+1,e_1+x-(j-1)y}\right)e_i+\ldots+$$
$$+\left(a_{n,e_1+x-(j-1)y}+c_{n,e_1+x-(j-1)y}-\frac{(j-1)}{n-2}c_{n,e_1+x-(j-1)y}\right)e_n.$$

Ba’zislar oldidagi koeffitsiyentlar tengligidan quyidagiga ega bo‘lamiz:

$$\begin{cases}a_1-b_3=b_{1,1}+b_{n+1,1}\\(j-1)a_3=(j-1)b_{n+2,2}\\a_3+a_4-(j-1)a_4=b_{1,3}+b_{n+2,3}-(j-1)b_{n+2,3}\\\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\\a_{i-1}+(i-3)a_i-(j-1)a_i=b_{1,\mathrm{i}-1}+(i-3)b_{n+2,i-1}-(j-1)b_{n+2,i-1}\\a_i+(i-2)a_{i+1}-\ (j-1)a_{i+1}=b_{1,\mathrm{i}}+(i-2)b_{n+2,i}-(j-1)b_{n+2,i}\\\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\\a_n+c_n-\dfrac{j-1}{n-2}c_n=b_{1,n}+(n-2)b_{n+2,n}-(j-1)b_{n+2,n}\end{cases}$$

Bundan , $b_{n+2,2}=b_{1,3}$, $b_{n+2,3}=b_{1,4}$, $b_{n+2,4}=b_{1,5}$,…, $b_{n+2,\mathrm{i}}=b_{1,\mathrm{i}+1}$,…, $b_{n+2,\mathrm{n}-1}=b_{1,\mathrm{n}}$ bo‘ladi.

$$\Delta\left(e_2+x-y\right)=b_{n+1,1}e_1+\left(b_{22}-b_{n+2,2}\right)e_2+b_{23}e_3+b_{n+2,4}e_4+2b_{n+2,5}e_5+\ldots+(n-4)b_{n+2,n-1}e_{n-1}+(n-3)b_{n+2,n}e_n$$
$$=D_{e_2+x-y}\left(e_2+x-y\right)=-b_{3,e_2+x-y}e_1+b_{3,e_2+x-y}e_3+\left(b_{2,e_2+x-y}-a_{3,e_2+x-y}\right)e_2+a_{5,e_2+x-y}e_4+$$
$$+2a_{6,e_2+x-y}e_5+\ldots+(n-2)a_{n,e_2+x-y}e_{n-1}+\frac{n-3}{n-2}c_{n,e_2+x-y}e_n,$$

tenglikdan $b_{n+1,1} = -b_{23}$ kelib chiqadi.

Endi quyidagi tenglikni ko‘rib chiqamiz:

$$\Delta\left(e_i + x - (i-1)y\right) = -b_{2,3}e_1 + (i-1)b_{n+2,2}e_2 + \left(b_{n+2,3} - (i-1)b_{n+2,3}\right)e_3 + \ldots +$$
$$+\left(b_{i,i} + (i-2)b_{n+2,i} - (i-1)b_{n+2,i}\right)e_i + \left(b_{i,i+1} + (i-1)b_{n+2,i+1} - (i-1)b_{n+2,i+1}\right)e_{i+1} + \ldots +$$
$$+\left((n-3)b_{n+2,n-1} - (i-1)b_{n+2,n-1}\right)e_{n-1} + \left((n-2)b_{n+2,n} - (i-1)b_{n+2,n}\right)e_n$$
$$= D_{e_i+x-(i-1)y}\left(e_i + x - (i-1)y\right) = -b_{3,e_i+x-(i-1)y}e_1 + (i-1)a_{3,e_i+x-(i-1)y}e_2 +$$
$$+\left(a_{4,e_i+x-(i-1)y} - (i-1)a_{4,e_i+x-(i-1)y}\right)e_3 + \ldots +$$
$$+\left(b_{2,e_i+x-(i-1)y} + (i-2)a_{1,e_i+x-(i-1)y} + (i-2)a_{i+1,e_i+x-(i-1)y} - (i-1)a_{i+1,e_i+x-(i-1)y}\right)e_i +$$
$$+\left(b_{3,e_i+x-(i-1)y} + (i-1)a_{i+2,e_i+x-(i-1)y} - (i-1)a_{i+2,e_i+x-(i-1)y}\right)e_{i+1} + \ldots +$$
$$+\left((n-3)a_{n,e_i+x-(i-1)y} - (i-1)a_{n,e_i+x-(i-1)y}\right)e_{n-1} + \left(1 - \frac{i-1}{n-2}\right)c_{n,e_i+x-(i-1)y}e_n$$

Bundan $b_{i,i+1} = b_{2,3} \quad i = \overline{3, n-1}$ kelib chiqadi.

$D\left(e_1 + e_2 - e_3 + x - y\right) = \Delta\left(e_1 + e_2 - e_3 + x - y\right)$ tenglikdan.

$$\Delta\left(e_1 + e_2 - e_3 + x - y\right) = \left(b_{1,1} - b_{2,3}\right)e_1 + \left(b_{2,2} - b_{1,3}\right)e_2 + \left(b_{1,3} + b_{2,3} - b_{3,3}\right)e_3 +$$
$$+\ldots + \left(b_{1,n} + (n-3)b_{n+2,n}\right)e_n$$
$$= D_{e_1+e_2-e_3+x-y}\left(e_1 + e_2 - e_3 + x - y\right) = \left(a_{1,e_1+e_2-e_3+x-y} + b_{3,e_1+e_2-e_3+x-y}\right)e_1 +$$
$$+\left(b_{2,e_1+e_2-e_3+x-y} - a_{3,e_1+e_2-e_3+x-y}\right)e_2 + (a_{3,e_1+e_2-e_3+x-y} + b_{3,e_1+e_2-e_3+x-y} -$$
$$-b_{2,e_1+e_2-e_3+x-y} - a_{1,e_1+e_2-e_3+x-y})e_3 + \ldots + \left(a_{n,e_1+e_2-e_3+x-y} + \frac{n-3}{n-2}c_{n,e_1+e_2-e_3+x-y}\right)e_n$$

$b_{3,3} = b_{2,2} + b_{1,1}$ ga ega bo‘lamiz.

Endi quyidagi tenglikni ko‘rib chiqamiz:

$$\Delta\left(e_i + x - (i-1)y\right) = -b_{2,3}e_1 + (i-1)b_{n+2,2}e_2 + \left(b_{n+2,3} - (i-1)b_{n+2,3}\right)e_3 + \ldots +$$
$$+\left(b_{i,i} + (i-2)b_{n+2,i} - (i-1)b_{n+2,i}\right)e_i + \left(b_{i,i+1} + (i-1)b_{n+2,i+1} - (i-1)b_{n+2,i+1}\right)e_{i+1} + \ldots +$$
$$+\left((n-3)b_{n+2,n-1} - (i-1)b_{n+2,n-1}\right)e_{n-1} + \left((n-2)b_{n+2,n} - (i-1)b_{n+2,n}\right)e_n$$
$$= D_{e_i+x-(i-1)y}\left(e_i + x - (i-1)y\right) = -b_{3,e_i+x-(i-1)y}e_1 + (i-1)a_{3,e_i+x-(i-1)y}e_2 +$$
$$+\left(a_{4,e_i+x-(i-1)y} - (i-1)a_{4,e_i+x-(i-1)y}\right)e_3 + \ldots +$$
$$+\left(b_{2,e_i+x-(i-1)y} + (i-2)a_{1,e_i+x-(i-1)y} + (i-2)a_{i+1,e_i+x-(i-1)y} - (i-1)a_{i+1,e_i+x-(i-1)y}\right)e_i +$$
$$+\left(b_{3,e_i+x-(i-1)y} + (i-1)a_{i+2,e_i+x-(i-1)y} - (i-1)a_{i+2,e_i+x-(i-1)y}\right)e_{i+1} + \ldots +$$
$$+\left((n-3)a_{n,e_i+x-(i-1)y} - (i-1)a_{n,e_i+x-(i-1)y}\right)e_{n-1} + \left(1 - \frac{i-1}{n-2}\right)c_{n,e_i+x-(i-1)y}e_n$$

$$\Delta(e_1+e_2-e_3+x-y)=(b_{1,1}-b_{2,3})e_1-b_{1,3}e_2+(b_{1,3}+b_{2,2}+b_{1,1}-b_{1,4})e_3+$$
$$+(b_{1,4}+b_{2,3}-b_{4,4})e_4+\ldots+(b_{1,n}+(n-4)b_{n+2,n})e_n$$
$$=D_{e_1+e_3-e_4+x-2y}(e_1+e_3-e_4+x-2y)=(a_{1,e_1+e_3-e_4+x-2y}+b_{3,e_1+e_3-e_4+x-2y})e_1-$$
$$-a_{3,e_1+e_3-e_4+x-2y}e_2+(a_{3,e_1+e_3-e_4+x-2y}+b_{2,e_1+e_3-e_4+x-2y}+$$
$$+a_{1,e_1+e_3-e_4+x-2y}-a_{4,e_1+e_3-e_4+x-2y})e_3+(a_{4,e_1+e_3-e_4+x-2y}+b_{3,e_1+e_3-e_4+x-2y}-$$
$$-b_{2,e_1+e_3-e_4+x-2y}-2a_{1,e_1+e_3-e_4+x-2y})e_4+\ldots+\left(a_{n,e_1+e_3-e_4+x-2y}+\frac{n-4}{n-2}c_{n,e_1+e_3-e_4+x-2y}\right)e_n$$

Bunda $b_{4,4}=b_{2,2}+2b_{1,1}$ kelib chiqadi.

Ushbu

$$\Delta(e_1+e_{i-1}-e_i+x-(i-2)y)=D_{e_1+e_{i-1}-e_i+x-(i-2)y}(e_1+e_{i-1}-e_i+x-(i-2)y),$$

Tenglikni xuddi shunday hisoblasak,

$b_{i,i}=b_{2,2}+(i-2)b_{1,1}$, $i=\overrightarrow{3,n}$ ega bo‘lamiz.

Xulosa. Demak, har bir local differensial $s_{n,2}$ differensialdir.

Foydalanilgan adabiyotlar ro‘yxati:

(1). Ayupov Sh.A., Kudaybergenov K.K., Rakhimov I.S. 2-Local derivations on finite-dimensional Lie algebras. Linear Algebra and its Applications. 474 (2015), p. 1–11.

(2). R.V.Kadison, Local derivations, J. Algebra. 130 (1990), p. 494–509.

(3). D.R.Larson, A.R.Sourour, Local derivations and local automorphisms of B(X), Proc. Sympos. Pure Math. 51 (1990), p. 187–194.

(4). Ayupov Sh.A., Kudaybergenov K.K., Omirov A.B. Local and 2-local derivations and automorphisms on simple Leibniz algebras. Bulletin of the Malaysian Mathematical Sciences Society. 43 (3) (2020), p. 2199–2234.

(5). Ayupov Sh.A., Kudaybergenov K.K. Local derivations on finite-dimensional Lie algebras. Linear Algebra and its Applications. 493 (2016), p. 381–398.

(6). Chen Z., Wang D. 2-Local automorphisms of finite-dimensional simple Lie algebras. Linear Algebra and its Applications. 486 (2015), p. 335–344.

(7). I.G‘.Yuldashev. Local derivations on solvable Lie algebras with a filiform nilradical. “Qoraqalpog‘istonda fan va ta’lim”, 2021, 4-son (18).

(8). I.Kaygorodov, K.K.Kudaybergenov, I.G‘.Yuldashev. Local derivations of semisimple Leibniz algebras. CIMPA School “Nonassociative Algebras and Its Applications”, Madagascar. Communications in Mathematics 30 (2022), DOI: https://doi.org/10.46298/cm.9274.

(9). Ayupov Sh.A., Kudaybergenov K.K. 2-Local derivations and automorphisms on $B(H)$ .Journal of Mathematical Analysis and Applications. 395 (2012), p. 15–18.

(10). Ayupov Sh.A., Kudaybergenov K.K. 2-local derivations on von Neumann algebras. Positivity. 19 (2015), p. 445–455.

(11). Ayupov Sh.A., Kudaybergenov K.K. 2-Local automorphisms on finite-dimensional Lie algebras. Linear Algebra and its Applications. 507 (2016), p. 121–131.

(12). Ayupov Sh.A., Kudaybergenov K.K., Rakhimov I.S. 2-Local derivations on finite-dimensional Lie algebras. Linear Algebra and its Applications. 474 (2015), p. 1–11.

(13). Ayupov Sh.A., Kudaybergenov K.K. Local Automorphisms on Finite-Dimensional Lie and Leibniz Algebras. Algebra, Complex Analysis and Pluripotential Theory, USUZCAMP 2017. Springer Proceedings in Mathematics and Statistics. 264 (2017), p. 31–44

(14). Becker T., Escobar J., Salas C., Turdibaev R. On Local Automorphisms of sl_2 . Uzbek Mathematical Journal. (2) (2019), p. 27–34