NILRADIKALI BERILGAN BA'ZI YECHILUVCHAN LEYBNITS ALGEBRALARINING 1/2-DIFFERENSIALLASHLARI

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Annotatsiya: *ushbu maqolada nilradikali maksimal uzunlikdagi kvazi-filiform Leybnits algebrasi bo'lgan yechiluvchan Leybnits algebrasining 1/2-differesiallashlari o'rganilgan.*

Kalit soz'lar: *Leybnits algebrasi, yechiluvchan Leybnits algebrasi, nilradikal, algebraning 1/2-differensiallashi.*

Abstract*: In this article we study 1/2-derivations of solvable Leibniz algebras whose nilradical is a quasi-filiform Leibniz algebra of maximal length.*

Keywords: *Leibniz algebra, solvable Leibniz algebra, nilradical, 1/2-derivation of algebra*

Аннотация: *В данной работе изучаются 1/2-дифференцирования разрешимых алгебр Лейбница, нильрадикал которых является квази-филиформной алгеброй Лейбница максимальной длины.*

Ключевые слова: *алгебра Лейбница, разрешимая алгебра Лейбница, нилрадикал, 1/2-дифференцирование алгебры.*

Ta'rif 1. $\mathbb{F}$ maydon ustida aniqlangan L algebraning ixtiyoriy x, y, z elementlari uchun quyidagi Leybnits ayniyati bajarilsa,

$$[x,[y,z]]=[[x,y],z]-[[x,z],y],$$

L algebra Leybnits algebrasi deyiladi, bu yerda [-,-] – L da aniqlangan ko'paytirish amali.

Ixtiyoriy L Leybnits algebrasi uchun quyidagi quyi markaziy va hosilaviy ketma-ketliklarni mos ravishda aniqlaymiz:

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

Ta'rif 3. L Leybnits algebrasi uchun shunday $s \in \mathbb{N}$ son mavjud bo'lib, $L^{[s]} = 0$ (mos ravishda, $L^s = 0$) bo'lsa, u holda L yechiluvchan (mos ravishda, nilpotent) Leybnits algebrasi deyiladi.

Ta'rif 4. Ixtiyoriy Leybnits algebrasining maksimal nilpotent ideali uning nilradikali deyiladi.

Ta'rif 5. L Leybnits algebrasi, agar $L^{n-2} \neq 0$ va $L^{n-1} = 0$ bo'lsa kvazi-filiform deyiladi, bu yerda $n = \dim L$.

Nilradikali N va to'ldiruvchi fazosining o'lchami s ga teng bo'lgan barcha yechiluvchan Leybnis algebralari oilasini $R(N, s)$ bilan belgilaymiz.

Quyidagi teoremada nilradikali maksimal uzunlikdagi kvazi-filiform Leybnits algebrasi bo'lgan va Q to'ldiruvchi fazosining o'lchami ikkiga teng bo'lgan yechiluvchan Leybnits algebralarini tasnifi keltiriladi.

Teorema 1. [2] $R(M^{1,0},2)$ algebralar oilasining ixtiyoriy algebrasi quyidagi algebraga izomorf:

$$R(M^{1,0},2):\begin{cases}[e_1,e_1]=e_n, & [e_i,e_1]=e_{i+1}, & 2\le i\le n-2,\\ [e_1,x_1]=e_1, & [e_i,x_1]=(i-2)e_i, & 3\le i\le n-1,\\ [e_n,x_1]=2e_n, & [x_1,e_1]=-e_1, & \\ [e_i,x_2]=e_i, & & 2\le i\le n-1.\end{cases}$$

Teorema 2. [2] $R(M^{2,\lambda},2)$ algebralar oilasining ixtiyoriy algebrasi quyidagi algebralardan biriga izomorf;

$$R(M^{2,0},2):\begin{cases}[e_i,e_1]=e_{i+1}, & 1\le i\le n-3, & [e_{n-1},e_1]=e_n,\\ [e_i,x_1]=ie_i, & 1\le i\le n-2, & [e_n,x_1]=e_n,\\ [x_1,e_1]=-e_1, & [e_{n-1},x_2]=e_{n-1}, & [e_n,x_2]=e_n.\end{cases}$$

$$R(M^{2,-1},2):\begin{cases}[e_i,e_1]=e_{i+1}, \quad 1\le i\le n-3, \quad [x_1,e_1]=-e_1,\\ [e_{n-1},e_1]=-[e_1,e_{n-1}]=e_n, \quad [e_n,x_1]=-[x_1,e_n]=e_n,\\ [e_i,x_1]=ie_i, \quad 1\le i\le n-2,\\ [e_{n-1},x_2]=-[x_2,e_{n-1}]=e_{n-1}, \quad [e_n,x_2]=-[x_2,e_n]=e_n.\end{cases}$$

Ta'rif 4. Aytaylik d– L Leybnits algebrasining chiziqli almashtirishi bo'lsin. Agar ixtiyoriy $x, y \in L$ lar uchun quyidagi tenglik bajrilsa

$$d([x, y])= \frac{1}{2}\ ([d(x), y]+[x, d(y)]),$$

u holda d chiziqli almashtirishga L Leybnits algebrasining $\frac{1}{2}$-differensiallashi deyiladi.

[1] ishda $R(M^{1,0},2)$, $R(M^{2,0},2)$ va $R(M^{2,-1},2)$ algebralarning differensiallashlari topilgan. Quyidagi tasdiqda $R(M^{1,0},2)$ algebrani $\frac{1}{2}$-differensiallashi topilgan.

Tasdiq 1. $R(M^{1,0},2)$ algebraning ixtiyoriy $\frac{1}{2}$-differensiallashi quyidagi ko‘rinishda bo‘ladi:

$$d(e_i) = a_{1,1}e_i, \quad 1 \le i \le n,$$
$$d(x_i) = a_{1,1}x_i, \quad 1 \le i \le 2.$$

Tasdiq 2. $R(M^{2,0},2)$ algebraning ixtiyoriy $\frac{1}{2}$-differensiallashi quyidagi ko‘rinishda bo‘ladi:

$$d(e_i) = a_{1,1}e_i, \quad 1 \le i \le n,$$
$$d(x_i) = a_{1,1}x_i, \quad 1 \le i \le 2.$$

$R(M^{2,-1},2)$ algebraning ixtiyoriy $\frac{1}{2}$-differensiallashi quyidagi ko‘rinishda bo‘ladi:

$$d(e_i) = a_{1,1}e_i, \quad 1 \le i \le n,$$
$$d(x_1) = b_{1,n}e_n + a_{1,1}x_1,$$
$$d(x_2) = b_{1,n}e_n + a_{1,1}x_2 .$$

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