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دراسة S – خاصة أصلية في صف جبور لي

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□ الملخّص □

هذا البحث مكرس للإجابة على السؤال التالي :

ليكن L جبر لي فوق حقل مميزه يساوي الصفر ولتكن S –خاصة أصلية في صف جبور لي .

هل S–خاصة أصلية تكون دوما مثالية مميزة في الجبر L ؟

للإجابة على هذا السؤال عرضنا أولا بعض التعريفات والمبرهنات والتمهيدات الضرورية ومن ثم برهنا أنه اذا كان D أي اشتقاق في جبر لي L بحيث أن $D(S(L))^n$ Í $S(L)$ حيث n اكبر او تساوي الواحد عندئذ $D(S(L))$ Í $S(L)$ وكذلك بينا انه من اجل أي جبر ارتيني $S(L)$ هي مثالية مميزة في L . وبعد ذلك اعطينا مثالا يجيب على السؤال الطروح ، إذ ليس من الضروري أن تكون S دوما مثالية مميزة في L .

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1 - Introduction

A subspace I of a Lie algebra L is called an ideal of L, if $x \in L$,$y \in I$,together imply $[x, y] \in I$.

A derivation D in L is a linear mapping of L into L satisfying the following condition: $D(xy) = D(x)y + xD(y)$ for every $x, y \in L$ .denote by Der (L)the set of derivations in L Ideal I of L is said to be characteristic ideal of L , denote it by $I < L$, if I is sub vector space of L and $D(I) \subset L$ for every $D \in$ Der (L).The ideal I of Lie algebra L is said to be D-invariant , if $D(I) \subseteq I$, D is derivation of L .Define a sequence of ideal of L by

$$L^{(0)} = L, L^{(1)} = [L, L], L^{(2)} = [L^{(1)}, L^{(1)}], \ldots L^{(i)} = [L^{(i-1)}, L^{(i-1)}]$$

Called L solvable if $L^{(n)} = 0$ for som n

Define a sequence of ideal of L by $L^0 = L, L^1 = [L, L], L^2 = [L, L^1] \ldots\ldots\ldots\ldots L^n = [L, L^{n-1}]$

L is called nilpotent if $L^n = 0$ for some $n \geq 1$.[see 1].

A Lie algebra L is called a complete Lie algebra if its center C (L) is zero and its derivation are all inner [see 2] . Let L be finite-dimensional Lie algebra over a field of characteristic zero, then L has Levi decomposition i.e. $L = S + R$, where S is a maximal semi simple sub algebra of L and is called the Levi sub algebra of L and R is maximal solvable ideal of L and its called the radical of L , the ideal

$I_0 = [L, L] \cap R = [L, R]$ is called the nilpotent radical of L [see 2] .

DEFINITION 1-1: The class S of S-algebra is said to be S-radical property in class Lie algebra, if the class S satisfy the following conditions:

1)- Class S is closed homomorphic,

2)- Every algebra L contain a maximal ideal belongs to class S, denote it by S(L) ,

3)- For every algebra L , quotient algebra $L / S(L)$ no contain ideals difference of zero belongs to class S .

S-radical property is called over solvable, if solvable algebra's belongs to class S .

II - D-INVARIANT RADICAL PROPERTY

All considered algebra in this part are Lie algebra over a field of characteristic zero

DEFINITION 2-1: S-radical property is said to be D-invariance if for every algebra L, its radical is characteristic ideal in L.

LEMMA 2-1: If I is an ideal of algebra L , such that $I^2 = I$, then I is characteristic ideal of L .

Proof its clearly.

LEMMA 2-2: Let S is an S-radical property, if there exists non zero S-radical of abelian algebra B, then S is a solvable property.

Proof: Let L be an arbitrary nonzero abelian algebra, denote by $< a >$ the ideal which generated by a in algebra L. Because L and B are abelian algebra's, so every linear mapping between L and B is homomorphism algebra, that is ideal $< a >$ is homomorphism image nonzero algebra S-radical B. Hence, ideal is S-radical its true for every element algebra L, then L is S-radical algebra. Further proof is induction on grade solvability algebra.

LEMMA 2-3: If I is S-radical ideal of algebra L, such that L / I is S-radical algebra, then algebra L is S-radical.

Proof: [see 1,3] .

THEOREM 2-1: If S-radical property is not invariance, then S is radical property over solvable.

Proof: Let S be a radical property which is not invariance on account derivation, then there exists so algebra L and so it derivation D, that S (L) not contain D(S(L)). By lemma 2-1 , we get $(S(L))^2 \neq S(L)$. Because algebra S(L) is S-radical , then

$B = S(L) / (S(L))^2$ is nonzero S-algebra . Algebra B is abelian, hence since lemma 2-1 we have S-radical property is over solvable.

LEMMA 2-3: If I is ideal of algebra L, D it derivation, then I + D(I) is also ideal of algebra L [see 1] .

LEMMA 2-4: If I is solvable ideal of algebra L , D it derivation , then I + D(I) is solvable ideal of algebra L [see 1] .

LEMMA 2-5: If I is ideal of algebra L, then for any derivation D of algebra L we get:

1)- $D(I^{(n+1)}) \subseteq I^{(n)}$,

2)- $D(I^{n+1}) \subseteq I^{n}$.

Proof: It is known [5], if I is ideal of algebra L, then for every natural number k> 0 , $I^{(k)}$, I^{k} are ideals in L . So we have

$D(I^{(n+1)}) = D[I^{(n)} , I^{(n)}] \subseteq I^{(n)} D(I^{(n)}) + D(I^{(n)}) I^{(n)} \subseteq I^{(n)}$

Proof to condition 2 is similar.

THEOREM 2-2: Let S be a radical property in class lie algebra, if D is any derivation of lie algebra L, that $D((S(L)^n) \subseteq S(L)^n$ for some $n \geq 1$,then $D ((S (L)) \subseteq S(L)$.

Proof: Let $D(S (L)^{(n)}) \subseteq S(L)^{(n)}$, $n \geq 1$. Since $S (L)^{(n)}) \subseteq S(L)$, then $S(L_1) = S(L)/ S(L)^{(n)}$, where $L_1 = L / S(L)^{(n)}$,from this we have that $S(L_1)$ is solvable ideal of algebra L , hence by lemma (2-4) $S(L_1) + D_1 (S(L_1))$ is solvable ideal in Algebra L ; where D_1 is derivation D-algebra L .

If S property is not solvable, then by theorem 2-1 we get $D(S(L)) \subseteq S(L)$. Assume that the S-property is over solvable, then $S(L_1) + D_1(S(L_1)) \subseteq S(L_1)$ hence $D_1(S(L_1)) \subseteq S(L_1)$ thus $D (S(L)) \subseteq S(L)$

Corollary 2-1: If radical S(L) algebra L satisfy condition $S (L_1)^{(n)}) = S(L)^{(n+1)}$ for some natural number n ,then S(L) is characteristic ideal in algebra L .

Proof: According to the lemma 2-5, $D(S (L)^{(n+1)}) \subseteq S(L)^{(n+ 1)}$ for any derivation D of algebra L , from this and from theorem 2-2 we have $D(S(L)) \subseteq S(L)$.

Theorem 2-3 : Let S be a S-radical property , then for every Artinian algebra L radical S(L) is characteristic ideal in L .

Proof: If L is Artinian algebra, then there exists a natural number k such, that $S (L)^{(k)} = S(L)^{(k+1)}$ from this and according corollary 2-1 from theorem 2-1 we have $D(S(L)) \subseteq S(L)$ for any derivation D of algebra L .

Corollary 2-2 : Let L be an algebra ,S-radical property and D-derivation algebra L if linear space D(S(L)) is finite dimensional ,then $D(S(L)) \subseteq S(L)$.

Proof: Since the linear space D(S(L)) has finite dimensional , therefore there exists a natural number n such that $D(S (L)^{(n)}) = S(L)^{(n+1)}$ from lemma 2-5 and corollary 2-1 from theorem 2-2 we get $D(S(L)) \subseteq S(L)$.

Now, we reflect over the following question. If radical algebra L precipitate as simple component in L the is it characteristic ideal in L ?

To this effect we consider the following situation.

Let φ be a any homomorphism algebra L in algebra B , we denote by $L \varphi B$ the simple sum $L \oplus B$ to vector spaces L,B which defined in following way :

The multiplication operation, if $a \in L$, $b \in B$, then $a.b = \varphi(a).b$ .Clearly show that $L \varphi B$ with above operation is Lie algebra over the same field .

In algebras L and B easy check, that B is ideal in algebra $L \varphi B$.

Lemma 2-6: Let D be a derivation of algebra $L \varphi B$ such, that D(B) non contain in algebra B ,then C(L) ,(the center of algebra L) is different of zero .

Proof: From assumption there exists an element $b \in B$ such, that $D(b) \notin B$. Hence $D(b) = b' + b^*$ where $b' \in B$, $b^* \in L$, $b^* \neq 0$. Now let a be a arbitrary element of algebra L , then $a.b = \varphi(a).b \in B^2$,consequently $D(a.b) = D(a).b + a.d(b) \in B$. Because $b, b' \in B$, that $B \ni D(a.b) = D(a).b + a.D(b) = D(a).b + ab' + ab^*$,since $D(a).b + ab' \in B$ then $ab^* \in B$. On the other hand $ab^* \in L$ hence $ab^* = 0$ that is the Centrum C (L) of algebra L contain element $b^* \neq 0$ as desired.

Theorem 2-4 : Let S-radical algebra $L \varphi B$ be equal to B ,then it is characteristic ideal in algebra $L \varphi B$.

Proof: According to the theorem 2-1 we can assume, that S-radical property is over solvable. Suppose that for certain derivation D of algebra $L \varphi B$, $D(B) \not\subset B$ from this and according to lemma 2-6 that in algebra L there exists nonzero ideal I Centrum C(L) algebra L . Algebra I + B is S-radical as homomorphic image

$(L \varphi B)/B$, this is not possible because $S(L \varphi B) = B$.

COROLLARY 2-3 : Let S be a S-radical property of algebra L,if the radical S(L)

Algebra L distribute as simple component, then it is characteristic ideal algebra L .

Proof: From assumption there exists ideal I algebra L, such that $L = I + S(L)$.

Let φ be a zero homomorphism algebra I in S(L), then

$L = I + S(L) = I \varphi_{=0} S(L)$. Now by theorem 2-4 $D(S(L)) \subseteq S(L)$ for any derivation D algebra L .

DEFINITION 2-2: Derivation d algebra L is said to be nil-derivation, if for every element $a \in L$ there exists as natural number $n>0$, such that $D^n(a) = 0$.

It is known [4,5] that if L is nil-derivation algebra L invariance relative on automorphism algebra L , $D(L) \subseteq L$. From this we have the following lemma.

LEMMA 2-7: If D is nil-derivation algebra L, then $D(S(L)) \subseteq S(L)$ whereas S is S-radical property.

Let $a_1, a_2, a_3, ..., a_n$ are elements of algebra L . Denote by $(a_1, a_2, a_3, ..., a_n)_\rho$ the multiplication n-elements of part bricks ρ , whereas ρ part bracket of word $a_1, a_2, a_3, ..., a_n$.

LEMMA 2- 8: Let $a_1, a_2, a_3, ..., a_n$ are elements of ideal I of algebra L, then for every derivation D algebra L we have

$$(D(a_1), D(a_2), ..., D(a_n))_\rho \in I + 1/n!\, D^n(a_1, a_2, ... a_n)_\rho$$

Proof: From inequality which we can fined in [6] we have

$$D^n(a_1, a_2, ..., a_n) = \Sigma \binom{n}{\alpha_1} \binom{n-\alpha_1}{\alpha_2} ... \binom{n-\alpha_1-\alpha_2-.......-\alpha_{n-2}}{\alpha_{n-1}} \left(D^{\alpha_1}(a_1), ..., D^{\alpha_n}(a_n)\right)_\rho \qquad (*)$$

Where the sum over all $\alpha_1, \alpha_2, .., \alpha_{n-1}$ such that $0 \le \alpha \le n$, $0 \le \alpha_i \le n-\alpha_1-..-\alpha_{n-1}$.

$\alpha_n = n-\alpha_1-..-\alpha_{n-1}$, $1 \le I \le n-1$, $D^0(a) = a$, as $\alpha_1+..+\alpha_n + \alpha$ and all exponent α_i are non negative , then $\alpha_1 = \alpha_2 = .. = \alpha_n = 1$ or $\alpha_I = 0$ for some I . If exponent $\alpha_I = 0$, then element

$(D^{\alpha_1}(a_1),\dots,D^{\alpha_n}(a_n))_r \in I.$

Because $\alpha_I \in I$ and $D(\alpha_I) = \alpha_I$ so one expression which all exponent α_I are non equal to zero , therefore $(D(\alpha_1), \dots, D(\alpha_n))_r$ is manoeuvrig factor is equal to n! hence from (*) we have $D^n(\alpha_1, \dots, \alpha_n)_r = n!\,(D(\alpha_1), \dots, D(\alpha_n))_r$.

Let us recall that an element x of Lie algebra L over a field K is called algebraic if there exists a polynomial $f(t) \in K[t]$ depending on x such that $f(adx) = 0$ [see 7].

DEFINITION 2-3: Derivation D algebra L is called algebraic derivation bounded index, if there exists a natural number $n > 1$, such that for every element $a \in L$, $D^n(a) \in \langle a, D(a), \dots, D^{n-1}(a)\rangle$, where $\langle a, D(a), \dots, D^{n-1}(a)\rangle$ is sub algebra generated by elements $a, D(a), \dots, D^{n-1}(a)$

THEOREM 2-5: Let S be a radical property, D derivation algebraic bounded index of algebra L, then $D(SL)) \subseteq S(L)$.

Proof: By virtue of theorem 2.1, we can assume, that S-radical property is over solvable, from definition of D there is a natural number n, such that

$D^n(\alpha) \in \langle \alpha, D(\alpha), \dots, D^n(\alpha)\rangle$ for some element $\alpha \in L$

Let $\alpha_1, \alpha_2, \dots, \alpha_n$ are any elements from radical S(L) and let $a = ((\dots(a_1 a_2)a_3)\dots)a_n)$, by virtue of lemma 2.5 we:

$$D^i(\alpha) \in D^i(S(L)^n) \subseteq S(A)^{n-i}, \qquad i = 1,2,\dots,n-1$$

So element $D^{n-1}(\alpha)$ belongs to radical S(L) algebra L . By virtue of lemma 2.3 $S(L) + D(S(L))$ is ideal of algebra L , hence $S(L) + D(S(L)) / S(L)$ is solvable ideal of algebra L/S(L) this is , in the presence of over solvable radical S, that

$S(L) + D(S(L)) \subseteq S(L)$,from this we have $D(S(L)) \subseteq S(L)$.

III-NORMAL RADICAL PROPERTY

Let L be a Lie algebra over a field K and let B always ,associative, commutative with unit element 1 (over also K) as known in [8] that $L \otimes_K B$ is Lie algebra and algebra L may be imbedding in algebra $L \otimes_K B$.

LEMMA 3-1 : If D is derivation of algebra B ,then the mapping

$$id \otimes d : L \otimes_K B \to L \otimes_K B$$

Defined at below:

$$(id \otimes_K d)\left(\sum a_i \otimes p_i\right) = \sum_{i=1}^{n} a_i \otimes d(p_i)$$

is derivation of algebra $L \otimes_K B$ .If however D is nil-derivation ,then derivation $id \otimes_K d$ is also nil-derivation .

Proof : see N. JACOBSON . Lie algebra .Intersciance New York 1962 page 158 .

DEFINITION 3-1 : We say that S-radical property is B-normal if for every algebra L , $S(L \otimes_K B) = I \otimes_K B$, where I is reliable ideal of algebra A .[see 5]

THEOREM 3-1 : S-radical property is B-normal iff for every algebra L , from condition $S(L\otimes_K B) \neq 0$ result consequence $S(L\otimes_K B) \cap A = 0$.

Now , we show following lemma .

LEMMA 3-2 : If for every algebra L there exists nil-derivations $d_1,d_2,...d_n$ algebra B such that from condition $S(L\otimes_K B) \cap L \neq 0$ consequence

$$(id \otimes d_1)(id \otimes d_2)...(id \otimes d_n) S(L \otimes_K B) \cap L \neq 0$$

then S-radical property is B-normal .

Proof: Suppose that $S(L\otimes_K B) \neq 0$ then there is element $0 \neq a \in S(L\otimes_K B)$ such that $d_1,d_2,...d_n$ are nil-derivation ,hence from lemma 2-7 and lemma 3-1 we have for i=1,2,3.. $(id\otimes d_n)(S(L\otimes_K B)) \subseteq S(L\otimes_K B)$, therefore

$$0 \neq (id \otimes d_1)(id \otimes d_2)...(id \otimes d_n)(a) \in S(A \otimes_K B) \cap A$$

Thus we have complete the proof .

THEOREM 3-2: Let L be a finite dimension algebra , then for every S-radical property , B-normal radical $S(L\otimes_K B)$ is invariance respect to derivation algebra $L\otimes_K B$.

Proof: S-radical property is B-normal ,then $S(L\otimes_K B) = I\otimes_K B$, because algebra L has finite dimension there exist a natural number n>0 that $I^{(n)} = I^{(n+1)}$, therefore we get $(S(L\otimes_K B))^{(n+1)} = I^{(n+1)} \otimes_K B^{(n+1)} = (I\otimes_K B)^{(n)} = (S(L\otimes_K B))^{(n)}$ Now according to corollary1from theorem 2-2 we have demonstration fact .

COROLLARY 3-1: Let L be a finite dimension algebra , then for every S-radical property , ideal $S(L[x_1,x_2,..,x_n])$ is characteristic ideal in $L[x_1,x_2,..,x_\alpha,...x_n]$ where $L[x_1,x_2,..,x_\alpha,...x_n]$ is polynomial algebra with infinite quantity variable, $x_1,x_2,..,x_n$,

Proof : It is known that algebra $L[x_1,x_2,..,x_\alpha,...]$ is isomorphic with algebra $L\otimes_K K[x_1,x_2,..,x_\alpha,...x_n]$, we show that every $K[x_1,x_2,..,x_\alpha,...x_n]$ radical property is normal . Suppose that $S(L\otimes_K K[x_1,x_2,..,x_\alpha,...x_n]) \neq 0$, then there is nonzero polynomial $W(x_{\alpha_1}, x_{\alpha_2},..., x_{\alpha_n}) \in S(A\otimes K[x_1, x_2,..., x_\alpha,...])$

It is known that derivation $d_\alpha (W)(W / x_\alpha)$ for every valued α is nil-derivation algebra $L[x_1,x_2,..,x_\alpha,...x_n]$. Now , we take right derivation $id \otimes d_\alpha$ we get

$$0 \neq (id \otimes d_{\alpha_{i,j}})....(id \otimes d_{\alpha_{i_k}}) W(x_{\alpha_1}, x_{\alpha_2},..., x_{\alpha_n}) \in S(A\otimes K[x_1, x_2,...., x_\alpha,...]) \cap L$$

Applying lemma 3.2 we have that S radical property is $K[x_1,x_2,..,x_\alpha,...x_n]$ normal hence from theorem 3-2 $S(L[x_1,x_2,..,x_\alpha,...x_n])$ is characteristic ideal in algebra $L[x_1,x_2,..,x_\alpha,...x_n]$.

Now we investigate problem invariable radicals $L\otimes_K B$, where B is a algebra group K[G] over a field K , G is abelian group .We define following symbol . Let $x = a_1 g_1 + a_2 g_2 + ...+ a_n g_n \in L \otimes K[G]$, where $a_1, a_2,..,a_n \in A$, $g_1, g_2 ..,g_n \in G$,denote by Supp x the set of element g_i such that $a_i \neq 0$.

If Suppx = { $g_1, g_2, ..., g_n$ },then the number n = l(x) is said to be length element x

LEMMA 3-3: Let S be a radical property, L algebra, G-group, if radical S(L[G]) algebra L[G] contain element x with length n , then S(L) contain element y which also length n and $e \in$ Supp y , where e is unit element of group G .

Proof: Take arbitrary element $z \in S(L[G])$, g any element group G. Because group G is abelian then its elements we can effective with operator of algebra

L [G] , therefore from [5,3] we get $zg \in S(L[G])$.

Now, let element $x \in (L[G])$, $l(x) = n$ and let $g \in$ Supp x because $l(x) = l(x/g)$, $e \in$ Supp(x/g) and $x/g \in S(L[G])$ then be enough take $y = x/g$

DEFINITION 2-3: Let K is a field. Group G is said to be K-complete if for every element $g \in G$, $g \neq e$, there is a homomorphism f group G in multiplication field K* such that $f(g) = 1$, 1 is unit element of field K .

LEMMA 3-4 : Let G be a complete group , then for every S radical property and every K-algebra L , if $S(L[G]) \neq 0$, then $S(L[G]) \cap A \neq 0$.

Proof: Let $a = \sum a_i g_i$ be a nonzero element from radical S (L[G]) with minimal length . By lemma 3-3 we can assume that $e \in$ Supp a. Assumption, that $g_1 = e$ we show that $l(a) = 1$. Assumption $g_2 \neq e$ because group G is K-complete, there exists a homomorphism $f : G \rightarrow K^*$ such that $l(g_2) \neq 1$.

We can defined mapping $\bar{f} : G \rightarrow L[G]$ at follows [see 6].

$$\bar{f}\left(\sum_i b_i g_i\right) = \sum_i b_i f(g_i) g_i \qquad , b_i \in L, g_i \in G$$

f is K-automorphism algebra L[G] ,$f(g_2) \neq 1$, $f(g_1) = 1$. Hence

$$0 \neq \sum_{i=2}^{n} [a_i - a_i f(g_i)] g_i = a - \bar{f}(a) \in S(L(G))$$

This is not possible, since $l(a - \bar{f}(a)) < n$ we have $l(a) = 1$ and $S(L[G]) \cap L \neq 0$.

COROLLARY 3-3: If group G is K-complete, algebra L has finite dimension, then for every S-radical property the radical S (L [G]) is characteristic ideal in algebra L [G] .

Proof: The proof is result from corollary 3-1 and theorem 3.2.

Now we give some example for S-radical property which is not invariable property.

P. M. Gohn [5], gave example Lie algebra in which equation $ax = b$ has solution for every $a \neq 0$, $a \in L$ and for every $b \in L$.

We consider algebra

$$R[[x]] = \{\sum_{i=1}^{\infty} a_i x_i \qquad ; a_i \in L\}$$

It is known that algebra of above formal series R[x] with coefficient from Lie algebra and set I formula series from $\Sigma a x$, $a_i \in L$ is ideal in R[[x]] .

We fined all image homomorphic of algebra I .

Let $0 \neq a \in L$ and let b be any element from ideal I , then

$$a = a_n x^n + a_{n+1} x^{n+1} + \ldots + ax^m + \ldots, \qquad a_n \neq 0$$
$$b = b_1 x + b_2 x^2 + b_3 x^3 + ..$$
$$a.b = c = c_{n+1} x^{n+1} + c_{n+2} x^{n+2} + \ldots. + c_{n+k} x^{n+k} + \ldots$$
$$c_{n+1} = a_n b_1$$
$$c_{n+2} = a_n b_2 + a_{n+1} b_1$$
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$$c_{n+k} = a_n b_k + a_{n+1} b_{k-1} + \ldots + a_{n+k-1} b_1$$

Because in algebra L , inequality $ax = b$ has solution for $a \neq 0$, $a \in L$ and for every $b \in L$, choose satisfactory accordingly coefficient $b_1, b_2, .., b_n, ..$. We can get any value $c_{n+1}, c_{n+2}, .., c_{n+k}, ..$ from this result that $I^{n+1} \subseteq \langle a \rangle$;

$\langle a \rangle$ is an ideal generated by element a from algebra L .

Now , let I / Y be any homomorphic image of algebra I , let $J \neq 0$ then there exists

$0 \neq a \in J \in I$ from this result there exists a natural number $m > 0$ such that

$I^m \subseteq \langle a \rangle \subseteq J$. We showed that every proper homomorphic image of algebra I is nilpotent .

Let S be a minimum S-radical property ,such that algebra I and all its homomorphic image belongs to class S, (by [8] this radical property exists) , we show that S(R[x]) = I . Clearly S(I) = I and quotient algebra R[[x]] / I is isomorphic to algebra L .

Algebra L non contain maneuverability ideals and is not nilpotent algebra , also algebras L and I are not isomorphic because $L^2 = L$ but $I^2 \neq I$ to mean that algebra L no contain nonzero S-ideals, hence S(R[[x]]) = I .

Now let $a = a_0 + a_1 x^1 + a_2 x^2 + .. + a_n x^n$ be an element of algebra R[[x]] . Mapping $D(a_0 + a_1 x + \ldots + a_n x^n) = a_1 + 2a_2 x + \ldots + na_n x^{n-1}$ is a derivation of algebra R[[x]] Let $a \neq 0$ be an element of algebra L , because

S(R[[x]]) = I then $ax \in I$, but for derivation D we have

$D(ax) = a \notin I = S(R[[x]])$.

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Calculation of the photoelectric cross-section for subshells P-compounds

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☐ ABSTRACT ☐

The intensity of the photoelectron peaks depends on a number of factors including the photoelectric cross-section,the electron escape depth, the spectrometer transmission, surface roughness or inhomogeneties.

Therefore, this work aims at calculating the photoelectric cross-section for different subshells of phosphorus –compounds.

By determining cross-section we could estimate the probability per incident photon for creating a photoelectron in a subshell.

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