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Key words and phrases. Stabilization of additive functors, zeroth derived functor, torsion, Bass torsion, cotorsion, Tate homology

This research was partially supported by the Shota Rustaveli National Science Foundation of Georgia Grant NFR-18-10849.

Some subsemimodules of differential semimodules satisfying the ascending chain condition

Ivanna Melnyk

Let R be a semiring and let M be a left semimodule over R. A map $\delta\colon R \to R$ is called a *derivation on* R [**2**] if $\delta\,(a+b) = \delta\,(a) + \delta\,(b)$ and $\delta\,(ab) = \delta\,(a)\,b + a\delta\,(b)$ for any $a, b \in R$. A semiring R equipped with a derivation δ is called a *differential semiring* with respect to the derivation δ [**1**]. A map $d\colon M \to M$ is called a *derivation* of the semimodule M, associated with the semiring derivation $\delta\colon R \to R$ if $d\,(m+n) = d\,(m) + d\,(n)$ and $d\,(rm) = \delta\,(r)\,m + rd\,(m)$ for any $m, n \in M$, $r \in R$. A left R-semimodule M together with a derivation $d\colon M \to M$ is called a *differential semimodule*.

A subsemimodule N of the differential R-semimodule M is called *differential* if $d\,(N) \subseteq N$. For a subset X of M its *differential* $X_{\#}$ is defined to be the set $X_{\#} = \{x \in M\,|d^n(x) \in X \,\text{for all}\, n \in \mathbb{N}_0\}$.

Let S be an m-system of R. A non-empty subset T of the R-semimodule M is called an *Sm-system* of M if for every $s \in S$ and $x \in T$ there exists $r \in R$ such that $srx \in T$.

A differential subsemimodule N of the differential semimodule M is called *quasi-prime* if it is maximal among differential subsemimodules of M disjoint from some Sm-system of M.

Theorem 1. *For a differential subsemimodule Q of R the following conditions are equivalent:*

(1) Q is a quasi-prime subsemimodule of M;
(2) $rad(Q)$ is a prime subsemimodule of M and $Q = (rad(Q))_{\#}$;
(3) There exists a prime subsemimodule P of M such that $Q = P_{\#}$.

Theorem 2. *For every differential subsemimodule N of the differential semimodule M satisfying the ascending chain condition on differential k-subsemimodules the following conditions are equivalent:*

(1) N is a differentially prime subsemimodule;
(2) N is a quasi-prime subsemimodule;
(3) $N = P_{\#}$ for some prime subsemimodule P of M.

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Key words and phrases. Quasi-prime subsemimodule, prime subsemimodule, differential semimodule

Class of differentiable invertible automatous with an algorithmically solvable conjugacy problem

Denis Morozov

In this abstracts conjugacy problem in the group of finite-state automorphisms of rooted binary tree investigated.

The research of group's automatous is technically complicated. The presentation of group's automatous with p-adic functions provides a convenient technique.

The following results solve the conjugacy problem for differentiable finite-state group's automatous.

Lemma 1. *Let*

$$a = (a_1, a_2) \circ \sigma, b = (b_1, b_2) \circ \sigma$$

$$a' = a_1 \circ a_2, b' = b_1 \circ b_2$$

and a' i b' are conjugated in $FAutT_2$.
Then a i b are conjugated in $FAutT_2$.

Definition 1. We denote the function $\phi_a(x)$ as follows:

$$\phi_a(b) = \begin{cases} -n-1,\ a=1,\ b=2^n(2t+1); \\ 2^s,\ a=2^s(2k+1)+1, s>0,\ b=0; \\ (2^n \mod 2^s)+2^s,\ a=2^s(2k+1)+1, s>0\ b=2^n(2t+1). \end{cases}$$

Theorem 1. *Two linear automorphisms $f(x) = ax + b$ and $g(x) = cx + d$ are conjugated in $FAutT_2$ then and only i $\phi_a(b) = \phi_c(d)$.*

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