The Centralizing Maps on Modules by using Idealization of Modules

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Let R be a commutative ring, and let M be an R-module. Nagata introduced the idealization $R(+)M$ of M. $R(+)M = R \oplus M$ with addition $(r_1, m_1) + (r_2, m_2) = (r_1 + r_2, m_1 + m_2)$ and multiplication $(r_1, m_1)(r_2, m_2) = (r_1 r_2, r_1 m_2 + r_2 m_1)$ is a ring. It is called the idealization of M. The idealization can be used to extend results about ideal to modules. A mapping f of R into itself is called centralizing if $[f(x), x] \in Z(R)$ holds for all $x \in R$. In this paper, we define the centralizing maps maps on module M over ring R. In this construction, we use the concept of idealization of modules. Furthermore, we give some examples of the centralizing maps of modules and investigate the characterization of the centralizing maps of modules.

References

[1] Divinsky, N.J. On Commuting Automorphisms of Rings. Trans. Roy. Soc. Canada. Sect. III 1955; 49(3):19-22.

[2] Bresar, M. Centralizing Mappings and Derivations in Prime Rings, Journal Algebra 1993; 156(2): 385-94.

[3] Bresar, M. Commuting Maps: A Survey. Taiwanese Journal of Mathematics 2004; 8(3): 361-97.

[4] Khan, A.N. Centralizing and Commuting Involution in Rings with Derivations. Commun. Korean Math. Soc. 2019; 34(4):1099-104.

[5] Hoque, M.F., Paul, A.C. Prime Gamma Ring with Centralizing and Commuting Generalized Derivations. International Journal of Algebra 2013; 7(13): 645-51.

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[6] Mahmood, A.H. Generalized Commuting Mapping in Prime and Semiprime Rings, Iraqi Journal of Science 2022; 63(8): 3600-04.

[7] Ebrahimi S., Talebi, S. Semi-Centralizing Maps and k-Commuting Maps of Module Extension Algebras. Journal of Mathematical Extension. Journal of Mathematical Extension 2015; 9(2): 9-25.

[8] Anderson, D.D., Winders, M. Idealization of a Module. Journal of Commutative Algebra 2009; 1(1): 3-56.

[9] Loan, N.T.H. On Canonical Modules of Idealizations. Journal of Commutative Algebra 2017; 9(1): 107-17.

[10] Tran, A.N. Primary Decomposition of Homogeneous Ideal in Idealization of a Module. Studia Scientiarum Mathematicarum Hungarica 2018; 55(3): 345-52.

[11] Batanieh, M., Anderson, D. Idealization and Polynomial Identities. Galsnik Matematicki 2014; 49(69); 47-51.

[12] Retert, K. Sets of Commuting Derivations and Simplicity. Communication in Algebra 2006; 34(8): 2941-63.

[13] Chen, Z., Wang, B. Commuting Derivations and Automorphisms of Certain Nilpotent Lie Algebras Over Commutative Rings. Communications in Algebra 2015; 43(5): 2044-61.

[14] Maubach, S. The Commuting Derivation Conjecture. Journal of Pure and Applied Algebra 2003; 179(1): 159-168.

[15] Pogudin, G. A Primitive Element Theorem for Fields with Commuting Derivations and Automorphisms. Selecta Mathematica 2019; 25(4): 1-19.