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Modules close to the automorphism-invariant and coinvariant

Truong Cong Quynh[*,¶], Adel Nailevich Abyzov[†,‖], Nguyen Thi Thu Ha[‡,**]
and Tülay Yildirim[§,††]

[*]*Department of Mathematics*
The University of Danang – University of Science and Education
459 Ton Duc Thang, Danang City, Vietnam

[†]*Department of Algebra and Mathematical Logic*
Kazan (Volga Region) Federal University
18 Kremlyovskaya Street, Kazan 420008, Russia

[‡]*Industrial University of Ho Chi Minh City*
12 Nguyen Van Bao, Go Vap District, Ho Chi Minh City, Vietnam

[§]*Department of Mathematics, Gebze Technical University*
41400 Gebze, Kocaeli, Turkey
[¶]*tcquynh@ued.udn.vn*
[‖]*Adel.Abyzov@kpfu.ru*
[**]*nguyenthithuha8282@gmail.com*
[††]*tyildirim@gtu.edu.tr*

The aim of this paper is to introduce a general setting where some well-known results on essentially injective modules, automorphism-(co)invariant modules and small projective modules can be obtained by developing a general theory of modules which are (co)invariant under automorphisms of their covers and envelopes.

Keywords: Essentially injective module; small projective module; automorphism-invariant module; automorphism-coinvariant module.

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1. Introduction

Throughout this paper, all rings will be associative rings with identity and our modules will be unitary right modules unless otherwise is stated. We will use the notation $N \leq M$, $N \leq^e M$, $N \ll M$ to stress that N is the submodule of M, N is the essential submodule of M and N is the small submodule of M, respectively. We write $J(R), J(M), \mathrm{Soc}(R_R), \mathrm{Soc}(M), Z(R_R)$ for the Jacobson radical of the ring

[¶]Corresponding author.