PARTIAL CO-REPRESENTATIONS OF HOPF ALGEBRAS

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Abstract: Partial actions arose in operator algebra study by Exel in [3] and it was extended to a purely algebraic context by Dockuchaev and Exel in [4]. The study of such a new structure has been developed in several directions, as the partial representation of partial group actions by Dockuchaev, Exel and Piccione in [5]. In [2], Caenepeel and Janseen developed the notion of partial actions of Hopf algebras on algebras, unifying partial actions of groups and actions of Hopf algebras. This new concept generates a rich theory, triggering the study of several aspects of this new structure.

In [1], Alves, Batista and Vercruysse developed the concept of partial representation of Hopf algebras, retrieving properties from partial representation of groups to this new setting. In that work, the authors defined a partial representation of a Hopf algebra H on an algebra A as a linear transformation $\pi\colon H \to A$ satisfying appropriated conditions. The authors defined the notion of partial H-module via partial representations of H on the endomorphism algebra $\mathrm{End}(A)$, they constructed the category of partial H-modules, they constructed a universal algebra (H_{par}) on which every partial representation is factorized and they showed H_{par} has a structure of Hopf algebroid.

The aim of this work is to present the study in development about the partial co-representations of coalgebras on Hopf algebras, exposing the properties and examples developed. A partial co-representation of a coalgebra C on a Hopf algebra H is defined as a linear transformation $\omega\colon C \to H$ satisfying several conditions, duals of those presented in [1]. The initial examples are got from well-known partial structures, so examples of partial co-representation are obtained from partial representations and from partial coactions on coalgebras. In this work, we develop the notion of partial H-comodules, we construct a universal coalgebra H^{par} that factorizes every partial co-representation by coalgebra morphisms, we show that the category of partial comodules is isomorphic to the category of H^{par}-comodules and show that it has a structure of Hopf coalgebroid.

WORK IN COLLABORATION WITH MARCELO ALVES, ELIEZER BATISTA, GLAUBER QUADROS AND JOOST VERCRUYSSE

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