

WHY HEAVILY SEPARABLE FUNCTORS? COMPARING MONADIC AND ADJOINT DECOMPOSITIONS

CLAUDIA MENINI

Abstract: Given a field k , the functor P , assigning to a k -bialgebra B the k -vector space of its primitive elements, admits a left adjoint T , assigning to a vector space V the tensor algebra TV endowed with its canonical bialgebra structure such that the elements in V becomes primitive. By investigating the properties of the adjunction (T, P) , we discovered that the functor T was fulfilling the stronger condition of separability that we called heavy separability. This fact was established in the framework of adjoint decomposition, that we introduce, and its relation, which we study, with monadic decomposition.

We recall that monadic decomposition was introduced in Appelgate, M. Tierney, *Categories with models*. 1969 Sem. on Triples and Categorical Homology Theory (ETH, zrich, 1966/67) pp. 156–244 Springer, Berlin. in the dual case, and further investigated in J. L. MacDonald, A. Stone, *The tower and regular decomposition*. *Cahiers Topologie Gom. Diffrentielle* 23 (1982), no. 2, 197-213. and in : J. Admek, H. Herrlich, W. Tholen, *Monadic decompositions*. *J. Pure Appl. Algebra* 59 (1989), no. 2, 111-123.