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On induced cotorsion pairs in functor category

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Abstract

The question of interest that motivates our work is how to ensure that the category Add (A,R-Mod) of additive functors has a projective / injective model structure without putting any conditions on the ring R. Essentially, it is motivated by the classical projective/injective/flat model structures on the category Ch(R) of chain complexes of left R-modules.

While we have been working on this problem with my collegues, in a recent work of Henrik Holm and Peter Jorgensen published in `https://arxiv.org/abs/2101.06176`, this problem is handled by using techniques/results in Gorenstein Homological Algebra.

Fortunately, our approach differs from theirs, and includes other contexts such as module category over a formal triangular matrix ring.

With this objective in mind, in this talk we will talk about how to build "possible" Hovey cotorsion pairs[1] in Add (A, R-Mod), and later we will present an explicit characterization of their objects. The results obtained on these cotorsion pairs in Add (A, R-Mod) generalize the known results in the categories of chain complexes of R-modules and modules over a formal triangular matrix ring. It is a work in progress with Sergio Estrada and Manuel Cortes Izurdiaga.

1: There is a close relation between abelian model structures in abelian categories and Hovey pairs; see [Hov02]. That's why we focus on finding suitable Hovey pairs in Add (A, R-Mod).

[Hov02] Hovey, M. Cotorsion pairs, model category structures, and representation theory. Math Z 241, 553–592 (2002).

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