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Hearts of twin cotorsion pairs on exact categories

Abstract: In the papers of Nakaoka, he introduced the notion of hearts of (twin) cotorsion pair on triangulated categories and showed that they have structures of (semi-) abelian categories. We study in this article a twin cotorsion pair $(\mathcal{S}, \mathcal{T}), (\mathcal{U}, \mathcal{V})$ on an exact category \mathcal{B} with enough projectives and injectives and introduce a notion of the heart. First we show that its heart is preabelian. Moreover we show the heart of a single cotorsion pair is abelian. These results are analog of Nakaoka's results in triangulated categories. We also consider special cases where the heart has nicer structure. By our results, the heart of a special twin cotorsion pair $(\mathcal{S}, \mathcal{T}), (\mathcal{T}, \mathcal{V})$, is integral and almost abelian. Finally we show that the Gabriel-Zisman localisation of the heart at the class of regular morphisms is abelian, and moreover it is equivalent to the category of finitely presented modules over a stable subcategory of \mathcal{B} .

It is also available at <http://arxiv.org/abs/1302.5187>.