

The purity filtration of modules over Auslander regular rings

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The purity filtration of modules is an important tool originating from homological algebra. It gives structural properties of a module (such as equidimensional submodules and their homological grades) and has numerous applications, e. g. in solving or simplifying systems of linear partial functional equations.

Based on the work [1], we will define the purity filtration, show some of its properties and give an algorithm, which allows us to compute the purity filtration of a finitely presented module over an Auslander regular ring. If the ground ring is also Cohen-Macaulay, the purity filtration gives additional insights on the structure of the module (concerning Gel'fand Kirillov dimension), which also will be pointed out. Finally, we will illustrate this theory with some examples, computed with our implementation [2] and give interpretations of the results.

References

- [1] A. Quadrat, *Grade filtration of linear functional systems*, Acta Applicandæ Mathematicæ 127, 27–86, 2013.
- [2] C. Schilli, V. Levandovskyy, *purityfiltration.lib*, a SINGULAR library, <https://github.com/Singular/Sources/blob/spielwiese/singular/lib/purityfiltration.lib>, 2012.