COMBINATORIAL CALCULATIONS OF HOMOLOGY

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It is well known that homology is a very important invariant of algebraic structures (group, monoids, algebras etc). In this talk we present a combinatorial way to calculate homology of groups, monoids and algebras which are presented via generators and relations. This technique is based on the Composition–Diamond lemma and "algebraic version" of discrete Morse theory (= algebraic discrete Morse theory). We show how to construct a resolution (=Anick's resolution) and how to define diagonal to determine a cup-multiplication in cohomology. We shall also discuss extensions of modules (groups) via this technique and give some examples which may help to understand some classical problems (conjugacy classes of braid groups).

References

[1] V. Lopatkin, Cohomology Rings of the Plactic Monoid via a Gröbner–Shirshov basis", *Journal of Algebra and its Applications,* **15**:4 (2016), 30pp.

[2] V. Lopatkin, *Thurston's Operations of the Braid Groups,* arXiv:1509.01834.

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