

BIBLIOGRAPHY TO ACCOMPANY “SHIFTED SIMPLICIAL COMPLEXES AND ALGEBRAIC SHIFTING”

ART M. DUVAL

ABSTRACT. This is a bibliography to accompany the slides from my talk at the AMS Regional Meeting at Binghamton University in October, 2003.

In general, a reference in the slides with a name and date has an obvious unique corresponding entry in the bibliography. Exceptions, and a few further explanations, are given below, organized by slide number.

Slide 6: One place to find an exposition of the idea that shifted complexes are “iterated near-cones” is [DRo00].

Slide 7: The basics of non-pure shellability are in [BW96], but also see [BW97], for instance for the canonical shelling of a shifted complex.

Slide 8: Exterior algebraic shifting goes back to [Ka84], though the best expositions may be [BK88], where I first read of it, or [Ka02], which contains (or at least seems to contain) everything that Gil Kalai knows or suspects to be true about algebraic shifting, including some brief historical notes. An earlier version of [Ka02] is [Ka93].

Slide 9: Herzog’s survey [He02] is probably a good place to start with symmetric shifting, including the cases where the ideal I is not squarefree monomial, *i.e.*, does not come from a simplicial complex. The three papers [AH00, AHH00a, AHH00b] represent just the (combinatorial) tip of the iceberg of work on generic initial ideals with the revlex order.

Slide 10: Kalai [Ka02] lists more “axioms” [Ka02, Theorems 2.1 and 2.2], and a more extensive example [Ka02, Example 2.4] of how to use them to figure out the algebraic shift of a complex. That “axiom” 5 follows from the four previous “axioms” I learned from a talk by Isabella Novik.

Slide 11: The “earlier version” due to Kalai is from [Ka93], and may be found in [Ka02, Section 4.3].

Slide 21: Kook and Reiner made their conjecture based on one example in a coffeehouse. I learned of it through personal communication. The theorem at the bottom of this slide, as well as the theorem at the bottom of slide 22, is from [Du03].

Slides 23 and 24: Theorems about integrality are from [DRe02], and theorems about “spectrality” are from [Du03].

REFERENCES

- [AH00] A. Aramova, J. Herzog, “Almost regular sequences and Betti numbers”, *Amer. J. Math.* **122** (2000), 689–719.
- [AHH00a] A. Aramova, J. Herzog, T. Hibi, “Ideals with stable Betti numbers”, *Adv. Math.* **152** (2000), 72–77.
- [AHH00b] A. Aramova, J. Herzog, T. Hibi, “Shifting operations and graded Betti numbers”, *J. Alg. Combin.* **12** (2000), 207–222.

- [BNT02] E. Babson, I. Novik, R. Thomas, “Symmetric iterated Betti numbers”, preprint, 2002. [arXiv:math.CO/0206063](https://arxiv.org/abs/math/0206063)
- [BCP99] D. Bayer, H. Charalambous, and S. Popescu, “Extremal Betti numbers and applications to monomial ideals”, *J. Algebra* **221** (1999), 497–512.
- [BK88] A. Björner and G. Kalai, “An extended Euler-Poincaré theorem”, *Acta Math.* **161** (1988), 279–303.
- [BW96] A. Björner and M. L. Wachs, “Shellable nonpure complexes and posets. I”, *Trans. Amer. Math. Soc.* **348** (1996), 1299–1327.
- [BW97] A. Björner and M. L. Wachs, “Shellable nonpure complexes and posets. II”, *Trans. Amer. Math. Soc.* **349** (1997), 3945–3975.
- [DW02] X. Dong and M. L. Wachs, “Combinatorial Laplacian of the matching complex”, *Electron. J. Combin.* **9** (2002), #R17, 11 pp.
- [Du03] A. M. Duval, “A common recursion for Laplacians of matroids and shifted simplicial complexes”, preprint, 2003. [arXiv:math.CO/0310327](https://arxiv.org/abs/math/0310327)
- [DRe02] A. M. Duval and V. Reiner, “Shifted simplicial complexes are Laplacian integral”, *Trans. Amer. Math. Soc.*, **354** (2002), 4313–4344.
- [DRo00] A. M. Duval and L. L. Rose, “Iterated homology of simplicial complexes”, *J. Alg. Comb.* **12** (2000), 279–294.
- [DZ01] A. M. Duval and P. Zhang, “Iterated homology and decompositions of simplicial complexes”, *Israel J. Math.* **121** (2001), 313–331.
- [FH98] J. Friedman and P. Hanlon, “On the Betti numbers of chessboard complexes”, *J. Alg. Comb.* **8** (1998), 193–203.
- [Ga79] A. M. Garsia, “Combinatorial methods in the theory of Cohen-Macaulay rings”, *Adv. Math.* **38** (1980), 229–266.
- [He02] J. Herzog, “Generic initial ideals and graded Betti numbers”, in *Computational commutative algebra and combinatorics* (Osaka, 1999), pp. 75–120, Adv. Stud. Pure Math., vol. 33, Math. Soc. Japan, Tokyo, 2002.
- [Ka84] G. Kalai, “Characterization of f -vectors of families of convex sets in R^d . I. Necessity of Eckhoff’s conditions”, *Israel J. Math.* **48** (1984), 175–195.
- [Ka91] G. Kalai, “The diameter of graphs of convex polytopes and f -vector theory”, in *Applied geometry and discrete mathematics*, pp. 387–411, DIMACS Ser. Discrete Math. Theoret. Comput. Sci., vol. 4, Amer. Math. Soc., Providence, RI, 1991.
- [Ka93] G. Kalai, “Algebraic Shifting”, unpublished manuscript (July 1993 version); updated and polished in [Ka02].
- [Ka02] G. Kalai, “Algebraic shifting”, in *Computational commutative algebra and combinatorics* (Osaka, 1999), pp. 121–163, Adv. Stud. Pure Math., vol. 33, Math. Soc. Japan, Tokyo, 2002.
- [Ko99] W. Kook, “Recursions in spectrum polynomial of matroids”, preprint, 1999. <http://hypatia.math.uri.edu/~andrewk/abstracts/>
- [KRS00] W. Kook, V. Reiner, and D. Stanton, “Combinatorial Laplacians of matroid complexes”, *J. Amer. Math. Soc.* **13** (2000), 129–148.
- [St79] R. P. Stanley, “Balanced Cohen-Macaulay complexes,” *Trans. Amer. Math. Soc.* **249** (1979), 139–157.

E-mail address: artduval@math.utep.edu

DEPARTMENT OF MATHEMATICAL SCIENCES, UNIVERSITY OF TEXAS AT EL PASO, EL PASO, TX 79968-0514