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Directed diagrammatic reducibility. (English) Zbl 07285174
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Summary: We introduce the notion of directed diagrammatic reducibility which is a relative version of diagrammatic reducibility. Directed diagrammatic reducibility has strong group theoretic and topological consequences. A multi-relator version of the Freiheitssatz in the presence of directed diagrammatic reducibility is given. Results concerning asphericity and π_1 -injectivity of subcomplexes are shown. We generalize the Corson-Trace characterization of diagrammatic reducibility to directed diagrammatic reducibility. We compare diagrammatic reducibility of relative presentations to directed diagrammatic reducibility. Classical tools for showing diagrammatic reducibility, such as the weight test, the max/min test, and small cancellation techniques are adapted to directed diagrammatic reducibility. The paper ends with some applications to labeled oriented trees.

MSC:

- 57K20** 2-dimensional topology (including mapping class groups of surfaces, Teichmüller theory, curve complexes, etc.)
- 57M05** Fundamental group, presentations, free differential calculus
- 20F06** Cancellation theory of groups; application of van Kampen diagrams

Keywords:

diagrammatic reducibility; asphericity; 2-complex; group-presentation; weight test

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References:

- [1] Barmak, J. A.; Minian, E. G., A new test for asphericity and diagrammatic reducibility of group presentations, Proc. R. Soc. Edinb., Sect. A, Math., 150, 2, 871-895 (2018) · [Zbl 1442.57008](#)
- [2] Bogley, W.; Pride, S., Aspherical relative presentations, Proc. Edinb. Math. Soc., 35, 1-39 (1992) · [Zbl 0802.20029](#)
- [3] Bogley, W.; Edjvet, M.; Williams, G., Aspherical in relative presentations all over again, (Groups St Andrews 2017 (2017))
- [4] Brodskii, S. D., Equations over groups, and groups with one defining relation, Sib. Math. J., 25, 235-251 (1984) · [Zbl 0579.20020](#)
- [5] Burns, R. G.; Hale, V. W.D., A note on group rings of certain torsion-free groups, Can. Math. Bull., 15, 441-445 (1972), MR0310046 (46 #9149) · [Zbl 0244.16006](#)
- [6] Corson, J. M.; Trace, B., Diagrammatically reducible complexes and Haken manifolds, J. Aust. Math. Soc. Ser. A, 69, 116-126 (2000) · [Zbl 0964.57003](#)
- [7] Gersten, S. M., Reducible diagrams and equations over groups, (Gersten, S. M., Essays in Group Theory. Essays in Group Theory, MSRI Publications, vol. 8 (1987)), 15-73 · [Zbl 0644.20024](#)
- [8] Harlander, J.; Rosebrock, S., Injective labeled oriented trees are aspherical, Math. Z., 287, 1, 199-214 (2017) · [Zbl 1381.57002](#)
- [9] Harlander, J.; Rosebrock, S., Relative vertex asphericity, Can. Math. Bull. (2020), in press
- [10] Howie, J., On the asphericity of ribbon disk complements, Trans. Am. Math. Soc., 1, 289, 281-302 (1985) · [Zbl 0572.57001](#)
- [11] Howie, J., A short proof of a theorem of Brodskii, Publ. Math., 44, 641-647 (2000) · [Zbl 0983.20025](#)
- [12] Huck, G.; Rosebrock, S., Aspherical labelled oriented trees and knots, Proc. Edinb. Math. Soc., 44, 285-294 (2001) · [Zbl 0983.57003](#)
- [13] Lyndon, R.; Schupp, P., Combinatorial Group Theory (1977), Springer Verlag: Springer Verlag Berlin · [Zbl 0368.20023](#)
- [14] Rosebrock, S., Labelled oriented trees and the Whitehead conjecture, (Metzler, W.; Rosebrock, S., Advances in Two-Dimensional Homotopy and Combinatorial Group Theory. Advances in Two-Dimensional Homotopy and Combinatorial Group Theory, Lect. Notes, vol. 446 (2018), Cambridge University Press: Cambridge University Press LMS), 72-97 · [Zbl 1435.57016](#)
- [15] Rosebrock, S., On the realization of Wirtinger presentations as knot groups, J. Knot Theory Ramif., 3, 211-222 (1994) · [Zbl 0824.57005](#)
- [16] Sieradski, A. J., A coloring test for asphericity, Quart. J. Math. Oxford (2), 34, 97-106 (1983) · [Zbl 0522.57003](#)

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