

Jovana Obradović
Institute of Mathematics, Czech Academy of Sciences

Combinatorial homotopy theory for operads

We introduce an explicit combinatorial characterization of the minimal model of the coloured operad encoding non-symmetric operads, introduced in [3]. The polytopes of our characterization are hypergraph polytopes [1, 2] whose hypergraphs arise in a certain way from rooted trees – we refer to them as operadic polytopes. In particular, each operadic polytope displays the homotopy relating different ways of composing the nodes of the corresponding rooted tree. In this way, our operad structure generalizes the structure of Stasheff’s topological A_∞ -operad: the family of associahedra corresponds to the suboperad determined by linear rooted trees. We then further generalize this construction into a combinatorial resolution of the coloured operad encoding non-symmetric cyclic operads.

References

- [1] K. Došen, Z. Petrić, Hypergraph polytopes, *Topology and its Applications* 158, 1405–1444, 2011.
- [2] P.-L. Curien, J. Ivanović, J. Obradović, Syntactic aspects of hypergraph polytopes, *J. J. Homotopy Relat. Struct.* <https://doi.org/10.1007/s40062-018-0211-9>, 2018.
- [3] P. Van der Laan, Coloured Koszul duality and strongly homotopy operads, PhD Thesis, [arXiv:math/0312147v2](https://arxiv.org/abs/math/0312147v2), 2003.