

Geometry and Combinatorics of Semiregular Polytopes

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Traditionally, a polyhedron or polytope is semiregular if its facets are regular and its symmetry group is transitive on vertices. We briefly review the semiregular convex polytopes, and then discuss semiregular abstract polytopes, which have abstract regular facets, still with combinatorial automorphism group transitive on vertices. Our focus is on alternating semiregular polytopes, with two kinds of regular facets occurring in an alternating fashion. The cuboctahedron is a familiar example in rank 3. We then describe recent progress on the assembly problem for alternating semiregular polytopes: which pairs of regular n -polytopes can occur as facets of a semiregular $(n+1)$ -polytope? If time permits, we brief discuss semiregularity in the context of skeletal polyhedra in 3-space. Most work is joint with Barry Monson.