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Right-angled polyhedra and alternating links. (English) Zbl 07570605

Summary: To any prime, alternating link, we associate a collection of hyperbolic right-angled ideal polyhedra by relating geometric, topological and combinatorial methods to decompose the link complement. The sum of the hyperbolic volumes of these polyhedra is a new geometric link invariant, which we call the right-angled volume of the alternating link. We give an explicit procedure to compute the right-angled volume from any alternating link diagram, and prove that it is a new lower bound for the hyperbolic volume of the link.

MSC:
57K10 Knot theory
57M50 General geometric structures on low-dimensional manifolds

Keywords:
hyperbolic geometry; alternating knot; guts; circle packing; right-angled polyhedra; ideal polyhedra; checkerboard surface; Conway sphere; Andreev theorem; hyperbolic volume; weaving knot; right-angled knot

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