

ON HYPERBOLIC AND SPHERICAL VOLUMES FOR POLYHEDRA AND ORBIFOLDS

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We describe a general approach for evaluation of volume for polyhedra in spaces of constant curvature. In the Euclidean space it based on the Tartaglia formula for the volume of tetrahedron. Then I. Kh. Sabitov recursive algorithm is applied to get a formula for an arbitrary polyhedron. In the hyperbolic and spherical spaces the starting point is trigonometric identities between dihedral angles and edge lengths of polyhedron.

The Schläfli formula have been used to find explicit integral formulae for the volume. We apply this approach to calculate the volume of tetrahedron, octahedron, cube and other polyhedra. In a similar way the hyperbolic and spherical volumes of knot and link orbifolds and cone-manifolds can be obtained. A new kind of the Santaló type formula relating volume of spherical polyhedron, the volume of its dual and their shared middle curvature is also established.

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