



UNIVERSIDAD
DE LA FRONTERA

SEMINARIO CRUZ DEL SUR

DEPARTAMENTO DE MATEMÁTICA Y ESTADÍSTICA

The volume of a compact hyperbolic tetrahedron in terms of its edges

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Martes 26 de Noviembre del 2019, 12h00
Auditorio Prof. Manuel López Ramírez

ABSTRACT.

In general, the problem is to find an exact formula for the volume of a hyperbolic polyhedron of prescribed combinatorial type. This is a very hard problem indeed. In general formulation, it was solved only for an arbitrary hyperbolic tetrahedron, which is a polyhedron of the simplest combinatorial type. The problem is still open for hyperbolic octahedra, hexahedra, etc. Moreover, all known formulas for arbitrary hyperbolic tetrahedron are expressing the volume in terms of its dihedral angles. In the present work, we obtain a general formula, which expresses the volume of a compact hyperbolic tetrahedron in terms of its edge lengths. (this is our joint work with Vuong Huu Bao)