The Title of a Standard LaTeX Article

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August 21, 2009

Abstract

We study the effects of warm water on the local penguin population. The major finding is that it is extremely difficult to induce penguins to drink warm water. The success factor is approximately $-e^{-i\pi} - 1$.

1 2009-2010 Proposals

1.1 Angle Structures

1.1.1 Proposed Project

Parameterize Euclidean two and three dimensional simplicial complexes using angles. For example, given a simplicial surface, an *angle structure* is an assignment of angles to the vertices of each triangle such that for the three angles $\alpha_1, \alpha_2, \alpha_3$ assigned to a triangle, we have $\alpha_1 + \alpha_2 + \alpha_3 = \pi$. Angle structures can be given in more general circumstances, including weighted triangulations.

This parametrization is used to find the angle structures that permit a metric (up to scaling). Several functionals would be studied related to the Lobachevsky function:

$$L(\alpha) = \int_0^{\alpha} -\ln|\sin(2x)|\, dx.$$

These functionals would require the implementation of an integration algorithm.

1.2 Refined, or maybe a GUI input

1.2.1 Proposed Project

A input program would be created to facilitate the entry of data (radii, etas, lengths, angles,...). This program would provide all necesary combinatorial information about the quantities being entered; for example, when inputting an Eta, the local tetrahedra, local faces, etc. would be available for consult. The current system requires the inspection of the output of the MakeTriangulation

program (standard format of the triangulation) in order to determine the specific simplices and sub-simplicies of interest.

This program could be implemented as a GUI much like that designed by Alex last school year, but with even greater capabilities.

1.2.2 Main obstacles

What is the best (or just a good) way to provide the necessary combinatorial data to facilitate input?

1.3 Intelligent Quantities

1.3.1 Proposed Project

Enable each quantity in the project with possibly multiple formulae. A logic algorithm would be used to determine if any of the valid quantities in the project are sufficient to calculate the given quantity using any one of the formulae.

Several dependency graphs would need to be generated for each choice of independent variables.

1.3.2 Main Obstacles

Logic algorithm described above. The generation of the dependency graph would need to be done by hand, or an algorithm that generates the graphs would need to be implemented.

1.4 Non-simplicial Triangulations

1.4.1 Proposed Project

Change all code that assumes that the triangulation is simplicial, that is, **remove** these assumptions from the project:

1. An edge has two distinct vertices
2. A face has three distinct vertices.
3. A tetrahedron has four distinct vertices, and six distinct edges
4. No two simplices have the exact same sub-simplicies of any particular dimension.
5. Two simplices can share more than one edge, face.

1.4.2 Main Obstacles

Finding all occurrences of 1-5 above.