



The University of Toledo

Department of Mathematics

Delta X and Pi Mu Epsilon Talk

Professor Robert Hardt
Rice University

Tuesday, March 3, 2009
7:00-9:00pm
UH 4410

Undergraduate Talk: Some Unknown Optimal Shapes

Abstract. The classical isoperimetric problem in 3-space is to find a region with a given volume that has the least surface area. It has long been known that the solution is a standard round ball. If one tries to solve this problem working with polyhedral regions, then one shaves to add more and more sides and approximates a ball. But suppose one tries to find the polyhedral region with given volume and least total “edge-length”? Can you guess the solution? This problem is unsolved as well as a whole family of related problems involving different dimensions and different dimensional areas. We will discuss what is known about the existence of a “generalized polyhedral” solution from the 1999 thesis of Scott Berger as well as the computations and results of several undergraduate research groups. A physical model is provided by trying to construct a least expensive waste storage container using totally free plates that are joined together by very expensive glue. Here the edge-length corresponds to the cost of the glue.

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Dinner at your expense with the speaker at the Phoenicia Restaurant, SU 3022, will begin at 5:15pm.