SBU Math Club Student Talk

Matveev Moves and Turaev-Viro
Invariants for 3-manifolds

Eben Kadile

Wednesday November 6, 2019
7PM
Math Tower P-131

Abstract

3-manifolds are a diverse and interesting class of structures; our understanding of them in both the geometrical and topological senses has been greatly advanced in recent decades. We will begin by defining 3-manifolds and giving a few examples. Then we will move on to a procedure for reducing a 3-manifold to a 2-dimensional representative of its structure called a "simple spine." We will see that these simple spines are very nice objects; any homeomorphism of a 3-manifold may be decomposed into a sequence of discrete, local moves, called Matveev moves, performed on its spine. Finally, after introducing the definition of a commutative ring with unity, we will show that Matveev moves may be converted to a set of algebraic equations over a ring. A solution to these equations is known as a Turaev-Viro invariant. We will provide a simple example of a Turaev-Viro invariant and, if time permits, we will work through an example calculation for this invariant.