Jack E. Graver (Syracuse)

When Does a Curve Bound a Distorted Disk?

Abstract for the Colloquium 2005 April 14

Consider a closed curve in the plane that does not intersect itself; by the Jordan Curve Theorem, it bounds a distorted disk. Now consider a closed curve that intersects itself, perhaps several times. Is it the boundary of a distorted disk that overlaps itself? If it is, is that distorted disk essentially unique? The question of when an immersion of the circle can be extended to an immersion of a disk has been studied by several people, notably Titus [C. J. Titus, ``The combinatorial topology of analytic functions on the boundary of a disk, Acta Math. 106 (1961), 45-64.] and Blank [S. J. Blank, ``Extending immersions of the circle, Dissertation, Brandeis University, Mass. (1967)]. I will discuss their work and then I will develop combinatorial techniques for answering these questions.
