RAINWATER SEMINAR

NOT theory (not knot theory)

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Thursday, February 23, 2017

C-36

1:30-2:20

Here "NOT" means a Non-Obtuse Triangulation, i.e., a triangulation where no angles are bigger than 90 degrees. A PSLG is a planar straight line graph; any finite collection of points and disjoint edges. A triangulation of a PLSG is a triangulation of the point set so that the edges of the triangulation cover all the given edges of the PSLG; we sometimes say the triangulation "conforms" to the PSLG. For various reasons, given a PSLG we would like to construct a conforming triangulation that uses a "small" number of triangles that have "nice" shapes. Here "small" means there is a polynomial bound for the number of triangles in terms of the number of elements in the given PSLG, and "nice" means the triangles are not long and narrow, i.e., there an upper angle bound strictly less than 180 degrees. I will explain why 90 degrees (giving non-obtuse triangles) is the best bound we can hope for and still get polynomial complexity. Linear sized NOTs for polygons were constructed in the early 1990's but the existence of polynomial sized NOTs for PSLGs has remained open until recently (July 2016 DCG). I will show how to construct NOTs in a special case (refining a triangulation of a polygon by diagonals to a non-obtuse triangulation in quadratic time), and then I will discuss some of the difficulties that must be overcome in the general case and how to deal with them. Our results improve various optimal meshing results of Bern, Eppstein, S. Mitchell, Edelsbruner and Tan, including improved complexity bounds for conforming Delaunay triangulations.