Temple University Mathematics Colloquium

Gilbert Strang
Massachusetts Institute of Technology

will speak on

Maximum area with new measures of perimeter

ABSTRACT: The oldest competition for an optimal shape (area-maximizing) was won by the circle. But if the fixed perimeter is measured by the line integral of $|dx| + |dy|$, a square would win. Or if the boundary integral of $\max(|dx|, |dy|)$ is given, a diamond has maximum area.

For any norm in $\mathbb{R}^2$, we show that when the integral of $||(dx, dy)||$ around the boundary is prescribed, the area inside is maximized by a ball in the dual norm. When $||\ ||$ is the l^2 norm, that ball is a circle. Our proof comes directly from the calculus of variations, where Busemann's original proof used inequalities from convex geometry. This isoperimetric problem has application to computing minimum cuts and maximum flows in a plane domain.

Monday, March 27, 2006
Lecture at 4:00 PM ($\sharp$)
Coffee, tea, and refreshments from 3-5 PM.
Room 617, Wachman Building
Department of Mathematics