CALIFORNIA STATE UNIVERSITY, LONG BEACH

THE MATHEMATICS COLLOQUIUM

Presents

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Speaking on

Dynamical Geometry: From Order to Chaos and Sierpiński Pedal Triangles

Tuesday November 13, 2007 12:00 noon–1:00 PM

in Room LA5-263

Abstract: We give an introduction to *discrete dynamical geometry*, an iterated dynamical system of geometric figures. A regular behavior is observed for some kinds of iterated triangles and cyclic polygons, and it can be proved via the Perron-Frobenius theory of nonnegative matrices. But an irregular or chaotic behavior appears when a sequence of *pedal triangles* of a given triangle are generated. Using pedal triangles, we construct new fractals called *Sierpiński pedal triangles* since they are reduced to the famous Sierpiński triangle when the initial triangle is equilateral. The fractal dimensions of Sierpiński pedal triangles are also calculated and it is proved that the well known dimension $\ln 3/\ln 2$ of the Sierpiński triangle is a local minimum of those of Sierpiński pedal triangles. It is conjectured that this local minimum is also a global minimum.

This talk serves as a sightseeing on the way from order to chaos in the garden of dynamical geometry, and it also provides a way of looking at the classic Euclidean geometry from a modern mathematics point of view. In addition, it provides insightful implications for teaching geometry at secondary level.