The SUMO Speaker Series for Undergraduates

(food from Pizza Chicago)
Wednesday, March 4th
5:15-6:15, room 380C

Deforming complicated plane curves to simple ones

Professor Richard Schoen

ABSTRACT:

The curve-shortening flow has been much studied in differential geometry over the past 25 years. In this talk we will introduce the problem, which involves the flow of a plane curve in the normal direction with speed equal to the curvature. It was shown by M. Grayson in 1987 that the flow converts an arbitrary "nice"' closed curve into a circle! Over the next 10 years Grayson's proof was clarified and simplified by R. Hamilton and G. Huisken.

We will describe the main ingredient in these simplifications, which involves finding a geometric quantity that is "improved"' under the flow and prevents the formation of certain types of singularities. Although this is a hard theorem, its proof uses only two-variable calculus together with a lot of cleverness. The curve-shortening flow is the simplest of several geometric flows whose study is a topic of current research interest in differential geometry. These flows have certain features and methods in common, particularly with regard to the formation of singularities.

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