



UNIVERSITY OF ROCHESTER

Mathematics and Physics Colloquium

ABSTRACT

The study of the space of closed curves in a plane is motivated by questions that arise in computer vision. It is a central problem in computer vision to devise algorithms by which computers can recognize images. To understand an image, one needs to identify the most salient objects present in this image. Some properties of the objects, like color or area, are readily quantifiable. On the other hand, objects in the world and their projections on the plane, depicted by two-dimensional images, possess a “shape.” The shape of an object is readily used by human observers to distinguish, for example, cats from dogs. A shape can be thought of as a closed curve in the plane. Hence, similarity between shapes can be quantified if one introduces a notion of distance (metric) on the space of closed curves. After that one can cluster together the shapes that are separated by a small distance such as different shapes of a cat. People are not puzzled by what it means to say that two shapes are similar: It suggests that we construct some sort of a mental metric that allows us to cluster together related objects and hence recognize them. It turns out to be very difficult to implement the notion of distance between shapes using computers.

The speaker will discuss the mathematical issues and methods that arise in studying the space of shapes and a certain notion of distance on this space.

Professor David Mumford

Winner of the Fields Medal (1974)

Member of the National Academy of Sciences

Division of Applied Mathematics
Brown University

*The Many Riemannian Geometries
of the Infinite Dimensional Space
of Simple Closed Plane Curves*

Thursday, March 22, 3:30–4:30 p.m.
Hoyt Auditorium

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