On Some Variational Problems in Differential Geometry

Miraj Samarakkody

November 1, 2023

Abstract

In the realm of natural phenomena, the guiding principle is the minimization of actions, leading to the emergence of the calculus of variations as a tool to seek the least action or energy. Within this framework, my talk delves into two distinct variational challenges within the domain of differential geometry. First, we explore the index characterization of a specific minimal surface, with a particular emphasis on the critical catenoid in a spheroid. Our aim is to determine the number of permissible deformations that substantially reduce the surface's volume to a second-order. Subsequently, we venture into another intriguing problem involving closed p-elastic curves existing in spheres within the Lorentz-Minkowski space. This investigation revolves around the identification and examination of generalized elastic curves, commonly referred to as p-elastic curves, in the spheres of Lorentz-Minkowski space. Additionally, we provide illustrative examples to illuminate these concepts further.