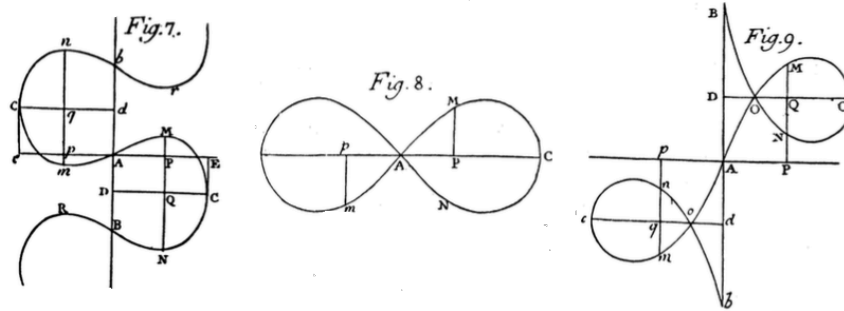


Elastic Curves

An elastic curve models the shape that a thin metal strip assumes when bent. Mathematically, these curves are characterized as minimizers of the bending energy, the total squared curvature of the curve. The problem of describing all planar elastic curves was proposed by Daniel Bernoulli to Leonhard Euler in 1744. Euler completely solved the problem and showed that there are exactly two closed elastica: the circle and the Euler figure eight. The study of elastic curves contributed substantially to the development of variational calculus, global aspects of curve theory, and elliptic functions. Thus, elastic curve theory encompasses a broad range of mathematical ideas and lies at the intersection of areas such as geometry, mathematical physics, differential equations, and complex analysis. In this project, we will study these areas of mathematics, and in so doing derive explicit parametrizations of all planar elastica.



Advisor: Allison Tanguay

Terms: Winter/Spring

Prerequisites: None