CHAPTER OVERVIEW

5: Calculus of Variations

The prior chapters have focussed on the intuitive Newtonian approach to classical mechanics, which is based on vector quantities like force, momentum, and acceleration. Newtonian mechanics leads to second-order differential equations of motion. The calculus of variations underlies a powerful alternative approach to classical mechanics that is based on identifying the path that minimizes an integral quantity. This integral variational approach was first championed by Gottfried Wilhelm Leibniz, contemporaneously with Newton's development of the differential approach to classical mechanics.

Thumbnail: Minimizing function and trial functions. (CC BY-SA 2.5; Banerjee).