

## **Necessary conditions for Optimal Control: an introduction based on set-separation.**

The course focuses on the celebrated Pontryagin Maximum Principle, which consists in some general necessary conditions for minima of Optimal Control problems. The latter generalize Calculus of Variations' problems, in that the velocities are dynamically constrained by ODE's with *control* parameters,.

The main proof we will present relies on a strong, intuitive, geometric idea, namely *set-separation*, which in turn is made precise by a suitable application of general tools such as cones' transversality and a directional open mapping theorem.

Time permitting, some issues from Geometric Control theory will be mentioned (e.g. Lie brackets), as well as connections with Hamilton-Jacobi PDE's.

During the days of the course I will be available at the University of Naples for all those who wish to look into some subjects in greater depth. Furthermore, at the beginning of the course detailed lecture notes will be available.

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