

GEOMETRIC APPROACH TO HIGHER ORDER MAXIMUM PRINCIPLE

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Pontryagin's Maximum Principle is an outstanding result which allows solving optimal control problems by means of optimizing a specific function on some particular variables, the so called controls. But that is not enough for solving all the above-mentioned problems. Then a higher order principle must be used in order to obtain more necessary conditions. These new conditions allow us to determine the controls and, under suitable assumptions, to solve the problem.

In this talk, we give a geometric introduction to the Higher Order Maximum Principle, describing higher order perturbation vectors and understanding them as an approximation to the reachable set of the control system. For affine connection control mechanical systems, we compare recent results on these perturbation vectors with the vector fields that appear in the constraints of a presymplectic algorithm coming from a weaker version of Pontryagin's Maximum Principle.